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STUDIES IN THE SOCIAL SCIENCES NUMBER 4

STUDIES IN THE MARKETING OF FARM PRODUCTS

BY

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AND

STUDENTS IN AGRICULTURAL ECONOMICS

MINNEAPOLIS
Bulletin of the University of Minnesota
February 1915

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CURRENT PROBLEMS

1. William Anderson, The Work of Public Service Commissions. November, 1913.

2. Benjamin F. Pittenger, Rural Teachers' Training Departments in Minnesota High Schools. October, 1914.

3. Gerhard A. Gesell, Minnesota Public Utility Rates. October, 1914.

4. L. D. H. Weld, Social and Economic Survey of a Community in the Red River Valley. January, 1915.

5. Gustav P. Warber, Social and Economic Survey of a Community in Northeastern Minnesota. In press.

PREFACE

The Division of Research in Agricultural Economics has devoted its energies largely to studies of marketing and farmers' organizations. The results of a statistical study of organizations have been published as Agricultural Experiment Station Bulletin No. 146, entitled *Statistics of Coöperation among Farmers in Minnesota.* The group of studies contained in the present publication represents primarily the results of research work that has been done in the general field of marketing. The papers by Messrs. Jesness, Warner, and Thompson were written under my supervision in the Seminar in Agricultural Economics during the year 1913-1914; the paper by Mr. Peterson was written as part of the work required in the general undergraduate course in Agricultural Economics. Mr. Jesness and Mr. Warner were graduate students, and Mr. Thompson and Mr. Peterson were seniors in the College of Agriculture. The paper by Mr. Cavert was written under the supervision of Professor C. W. Thompson during the year 1912-1913, and the time of writing this report should be taken into consideration in reading it. All of these men had their major work in other divisions of the College of Agriculture, and hence could not spend as much time on marketing investigations as a full treatment of their subjects would require. All of the papers, however, represent original research work, and although not by any means complete studies of the topics treated, it is deemed that they contain enough new and valuable information in an important and neglected field, to make their publication worth while. The paper entitled Market Distribution was read before the American Economic Association at Princeton, N. J., in December, 1914, and is published in the *Papers and Proceedings* of that association. Permission to reprint in this place is gratefully acknowledged by the University of Minnesota and by the author.

L. D. H. WELD,
Chief of Division

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MARKET DISTRIBUTION[1]

By L. D. H. Weld

Marketing is a part of production. It has to do with the creation of time, place, and possession utilities, whereas manufacturing has to do with the creation of form utilities. In discussing the problems of production, economists have usually had in mind primarily the manufacturing end, and they have drawn their illustrations of division of labor, large-scale production, organization of industry, etc., from this field. Likewise agricultural economists have given their attention principally to crop-growing, or as some call it, the "production" end of agriculture. It is true that some economists have sought to point out the application of general economic principles to mercantile organization, but never in such a way as to throw light on the present system, or to point out its weaknesses.

And yet that part of production which is covered by marketing is extremely important as compared with the manufacturing or crop-growing process. A comparison of factory or farm cost with final retail price of almost any commodity will prove this. Economists agree that they have neglected this branch of their subject, but few realize either the alluring fields for research which offer themselves, or the serious consequences that their neglect has brought about. As it is to-day, the whole system of marketing farm products stands condemned in the eyes of the public. The great majority of people believe that there is something radically and fundamentally wrong. In the agricultural parts of the country there is nothing that stirs up enthusiasm so much as fiery denunciation of present marketing methods. Many extravagant and misleading statements have passed unchallenged and have been spread broadcast throughout the country. Things have come to pass that in some of our agricultural states a college professor who finds anything sound or justifiable in the present marketing organization runs the risk of exciting serious adverse criticism, and even charges that he is "in league with the interests." Do the generally accepted principles of economics, if applied to this subject, reveal any such fundamental weaknesses as are supposed to exist, or rather do they result in a justification of the present system? It is high time that we undertook to answer this question.

Much help may be derived from an application of the principle of division of labor and specialization to the marketing process. Farm prod-

[1] This paper was read at the annual meeting of the American Economic Association at Princeton, N. J., on December 29, 1914, and is published in the *Papers and Proceedings of the Twenty-Seventh Annual Meeting of the American Economic Association.*

ucts, in passing from farmer to consumer, normally pass through the hands of certain middlemen, who may be classed roughly as local buyers or country shippers, transportation companies, one or more classes of wholesale dealers, and finally retailers. The need of the local shipping unit, in order to consolidate small contributions of individual farmers into car lots, to furnish storage facilities until time of shipment, and to establish trading connections with city dealers, is apparent. It is the link or links between country shipper and the retail store that many people have in mind when they say that there are too many middlemen.

The need of wholesale produce distributors may best be demonstrated by a consideration of the reasons why country shippers do not and can not generally sell their goods direct to city retail stores. These reasons are as follows:

1. To procure the greatest economy in local shipment, the quantity sent at one time is too great for most retailers to handle. Retailers carry a large variety of products, and storage facilities for handling large units of various commodities are out of the question. Goods would have to be sent in small allotments, and retailers would have to obtain these small allotments from a great variety of sources.

2. Shipments from local units vary in quantity from shipment to shipment and for different times of year. The city supply of many commodities comes first from one producing section and then from another. The city retailer must be able to buy from day to day in order to correlate his supply with his demand. Furthermore, the shipments from the country at one period will be insufficient, whereas at another period they are much greater than retailers can absorb. This surplus must be carried by a separate class of middlemen from the period of surplus production to that of insufficient production.

3. The quality of commodities sent by a country shipper is very variable, whereas each retail store has a fairly definite class of trade and must have goods of fairly constant quality.

4. Business relations between country shippers and retail stores are difficult to establish, and once established are difficult to maintain.

5. Retailers are notoriously "slow pay." Even wholesalers, who are in close touch with city retailers, have their difficulties in making them pay for goods within a reasonable time. Country shippers can not afford to wait for their money, because they must be paying cash for goods as they are brought in by farmers from day to day. This one obstacle is almost enough in itself to prevent direct selling from country shipping unit to retail store; at least it has been the reason why innumerable attempts at such direct sale have been given up.

These reasons suggest the functions of wholesale dealers. These functions are not generally understood; they are much more difficult, and require

a much higher degree of organization and business ability than most people realize. Frequently they will be subdivided among two or three different sets of wholesalers, as, for example, a commission merchant, handling goods on consignment, and a wholesaler; or, a wholesale receiver who buys outright, and a jobber, who sells to retail stores. In fact, it is safe to say that the great bulk of farm products arriving in our large cities passes through the hands of at least two such classes of wholesalers. For example, a large proportion of the butter made in the 800 creameries of Minnesota is marketed in New York City, passing first through the hands of a wholesale receiver, and then through the hands of a jobber. The wholesale receiver specializes in the solicitation of shipments from country creameries in Minnesota, the financing of these creameries by allowing them to draw drafts on day of shipment, the handling and storage of large lots of butter on arrival in New York, and the rough sorting-out according to quality. These functions naturally constitute a business in itself. The jobber performs an entirely different set of functions: he buys from the wholesale receiver in round lots of say from twenty to fifty tubs at a time; he sends salesmen around to innumerable stores in New York to find purchasers; he sells one tub at a time, selecting just that quality of butter which he knows each retailer, or delicatessen, or restaurant, or hotel, or steamship company wants; he delivers the one tub at a time to various parts of the city; and he very largely finances the retail stores by giving them credit, and undertakes the necessary accounting expense and losses incident to dealing with scores of small retail shops. All of these many functions now performed by the receiver and the jobber may be performed by one firm—and sometimes they are—but it has been found economical to subdivide these various steps among two different sets of middlemen for a large proportion of the trade, each set specializing on one particular class of functions.

Economists have been fond of praising the minute division of labor in the packing plant, the shoe factory, etc., and also the high degree of specialization of industrial plants, whereby one makes pig iron, another makes steel, another structural forms, etc. Often the same men who praise the economies made possible by this "age of specialization," when they hear that there are middlemen called local buyers, commission men, brokers, jobbers, etc., hold up their hands in holy horror and exclaim that there are too many middlemen. Possibly there are in some cases, and yet in still other cases the cost of marketing might be reduced by adding more middlemen. While studying the wholesale produce trade in New York City last summer, I found butter jobbers who were cutting up butter that they had bought from wholesale receivers into one-pound prints. I told them that I could add two middlemen to their present system of marketing, and reduce the total cost thereof: first, that it would be cheaper to have their cutting

done for them by other firms who could keep their machinery and skilled labor constantly employed in cutting prints; and, second, that they could save on their delivery expense by turning this function over to a centralized or coöperative delivery system, which would eliminate the vast duplication of delivery equipment and constant covering and re-covering of the same ground by a hundred different firms.

There appears to be no reason why this specialization argument should not apply to the creation of time, place, and possession utilities in the marketing process as well as to the creation of form utilities. Furthermore, it should be remembered that the present organization of the wholesale trade is not a rigid and arbitrary system. The various dealers in the main are keen competitors of each other and there are certain adjustments and readjustments going on at all times. The members of each class of wholesalers are constantly experimenting (unconsciously perhaps) by undertaking the functions of other wholesalers and overlapping into their fields of activity. Sometimes this sort of an experiment results in the dealer's falling back into his original and more specialized field, and sometimes it results in successfully combining several functions, especially when done on a large enough scale, thus resulting in what we may call integration of marketing processes, just as we speak of integration of industry. But it should be understood that when there is such integration, specialization still exists, at least among the departments of a business, just as in the case of manufacturing plants. In other words this economic justification of the present system of minute subdivision furnishes no reason for objecting to, or for not seeking out, more economical combinations of functions any more than a shoe manufacturer would hesitate to install a machine which would combine the operations now performed by three or four different workmen. The chain store may perhaps be considered such a machine in the merchandising field, because in marketing farm products, it takes over the functions of the jobber,[2] and, to a certain extent, of the wholesale receiver, with certain resulting economies.

Since there appears to be good economic reason for the subdivision of the merchandising process into several successive steps, it would not be surprising to find that some commodities that pass through the hands of several middlemen are marketed on smaller spreads than are other commodities that pass more directly from producer to consumer. It would be a simple matter to furnish innumerable examples of this. In other words, the cost of marketing a commodity does not depend on the number of middlemen involved; rather it depends on certain characteristics of the commodity itself. Much is said about the great waste in marketing as evidenced by the wide spread between farm producer and city consumer.

[2] The term "jobber" is used in this place to mean the second handlers described above in connection with the New York butter trade.

Some say that the producer gets, on the average, forty-six per cent of the price finally paid by the consumer; others put it as low as thirty-five per cent. Even if the correct average figure could be determined, it would be of little significance, because it gives no idea of the great variation in cost of marketing different commodities, a fact which has been commonly overlooked in discussions of this subject.

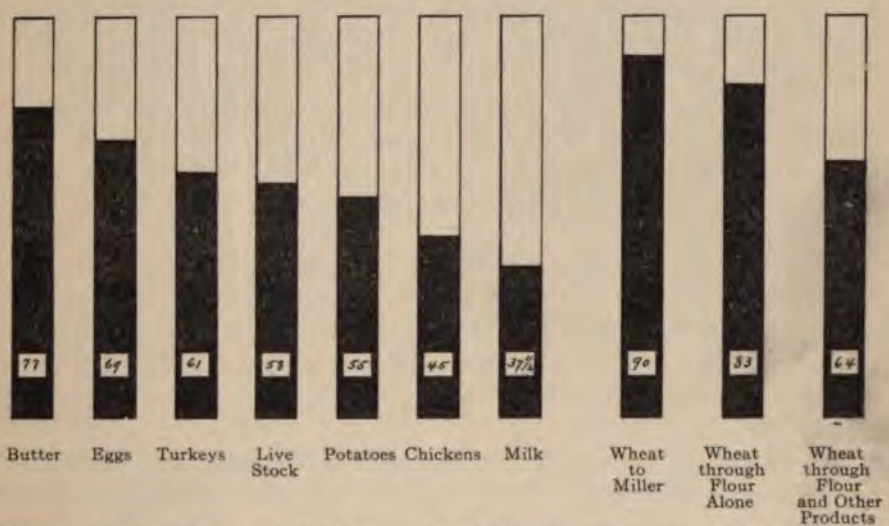


Diagram Showing Approximate Proportion of Minneapolis Retail Price Received by Minnesota Farmers, February, 1914

The proportions of Minneapolis retail prices received by Minnesota farmers for various commodities as computed in February, 1914, were approximately as follows:

	Per cent of retail price received by producer
Butter	77*
Eggs	69
Turkeys	61
Live stock	58
Potatoes	55
Chickens	45
Milk	37½
Wheat:†	
to miller	90
through flour alone	83
through flour and other products	64

* Represents proportion of retail price received by country creamery.

† These figures for wheat were computed from data in Bulletin No. 130 of the United States Bureau of Labor Statistics, *Wheat and Flour Prices from Farmer to Consumer.* The data in this bulletin were based on the Kansas City market, but they apply at least approximately to the Minneapolis market.

Although these figures were compiled in Minnesota, they represent very closely the conditions in other parts of the country. At least, they give a good idea of the variation in cost of marketing different commodities, which is the object of their use in this place. If such commodities as apples, asparagus, lettuce, etc., were included, the proportion received by the farmer would be much less. The California cantaloupe grower, for example, receives less than twenty per cent of the price for which his cantaloupes sell in New York City. The principal reasons for this variation in cost of marketing aside from distance from market are as follows:

1. Perishability. The more perishable a commodity is, the greater the cost of marketing. This is the principal reason for the wide spread on such articles as strawberries, cantaloupes, lettuce, etc. In the case of other commodities, such as butter and eggs, perishability is largely overcome by cold storage.

2. Regularity or irregularity of supply throughout the year. The more evenly the production of a commodity is distributed throughout the year, the less it costs to market it. Although butter and eggs are produced in greater volume during some seasons than others, the fact that they are produced to a certain extent at all seasons undoubtedly reduces their costs of marketing.

3. Waste and shrinkage. Closely allied to the question of perishability is the extent to which products are subject to damage, breakage, or shrinkage in transit, in storage, or in preparation for market. Breakage is an important factor in egg marketing; shrinkage in poultry marketing.

4. Volume in which product is handled. For those commodities that are handled in greatest volume, the facilities for marketing have become more highly developed. To say nothing of superior transportation facilities, efficient cold storage plants aid in the marketing of poultry and butter; special loading and unloading machinery and highly efficient terminal elevators in the marketing of grain.

5. The extent to which a commodity may be subdivided into well-established qualities or grades. There is a well-recognized method of "scoring" butter which facilitates its handling. Grain is subdivided into such universally accepted grades that it is often bought and sold by merely naming the grade or at least by inspection of a small sample. When the buyer must carefully inspect the whole of the commodity he is buying, the cost of marketing is apt to be higher. The possibility of having standard grades enables the use of market quotations, which are often used as "trading bases" and which immensely facilitate the marketing of commodities.

6. The relation between bulk of a commodity and its intrinsic value, which affects the importance of the freight rate as a factor in marketing. Potatoes and grain are of large bulk but of small intrinsic value, and

hence the transportation charge constitutes a larger proportion of the total spread between producer and consumer than in the case of butter, which is a commodity of small bulk in relation to its value.

When these differences in cost are considered, it is apparent that some commodities are marketed on very small margins. As compared with manufactured articles in general, the great staple farm products pass through the hands of a greater number of middlemen but are marketed on smaller gross margins. Those who have been fond of calling attention to the wide spread between producer and consumer have dwelt on apples, strawberries, cantaloupes, celery, and other highly seasonal and perishable articles, and have failed to notice that the much more important products like wheat, butter, eggs, etc., are marketed on relatively small margins. If these staple articles were given their due weight in finding an average for all commodities, I believe that it would be found that the proportion received by farmers would be considerably higher than any figure heretofore spread broadcast by writers and speakers on this subject. From computations that I have made for Minnesota products, I am convinced that on the average the Minnesota farmer receives about sixty per cent of the price finally paid for his products.[3] Not that the exact per cent is of any particular value in itself, but that the estimates heretofore given out are both inaccurate and misleading.

But to get to the real heart of the marketing problem, it is necessary to carry our study of marketing costs still further and analyze the gross spreads between producer and consumer for different commodities into their component parts. As illustrations of this kind of research, I present an approximate analysis of marketing costs for two different commodities: Minnesota butter marketed in New York City, and Minnesota poultry marketed in Minneapolis. In both of these cases it will be observed that certain manufacturing costs are included with the marketing costs.

[3] This figure is a rough average of the proportions of final retail prices received by farmers for various commodities, weighted with the respective values of the commodities that were *marketed* by Minnesota farmers. The values marketed were obtained directly from the 1910 census in some cases; in others, they have been estimated from production statistics. The proportions received by producers as used in this computation do not agree absolutely with those given in the text on page 5, because allowances have had to be made for many complicating factors. The true weighted average of these figures is over sixty-three per cent, although it is referred to as sixty in the text for the purpose of being safely conservative. The figures used in the computation are as follows:

	Value of commodity marketed	Per cent of retail price received by farmer
Milk	$ 7,000,000	45
Cream	1,400,000	40
Butter fat	11,000,000	75
Dairy butter	3,600,000	75
Poultry	1,800,000	45
Eggs	6,200,000	69
Live stock	34,000,000	55
Grains	56,000,000	70
Potatoes	3,000,000	50
Other vegetables	1,000,000	30
Fruits	200,000	30

APPROXIMATE AVERAGE COST PER POUND OF MARKETING MINNESOTA BULK BUTTER IN NEW YORK CITY

	Cents per pound
Farmer receives for ⅘ pound of butter fat	25.0
Cost of manufacture in creamery	2.5
Freight and cartage to New York	1.5
Wholesale receiver's gross margin	0.5
Jobber's gross margin	1.5
Retailer's gross margin	5.0
Price paid by consumer	36.0

This varies of course with the different channels through which butter passes. Since butter is often used as a leader by grocery stores, the retail margin is often less than five cents.

APPROXIMATE AVERAGE COST PER POUND OF MARKETING CHICKENS FROM MINNESOTA FARM TO MINNEAPOLIS CONSUMER

	Cents per pound
Farmer receives	9.1
Transportation (by express)	1.4
Feeding	0.25
Killing labor and expense	0.75
Killing loss in shrinkage	1.0
Packing	0.5
Storage, interest, and insurance (three months)	1.1
Wholesaler's gross margin (overhead and delivery cost and profits)	1.9
Retailer's gross margin	4.0
	20.0

From analyses of this sort, certain important facts are brought out: first, the part played by transportation costs is almost insignificant when considered as a proportion of final retail price. It has been estimated that, on the average, freight charges do not constitute more than five per cent of retail prices. Numerous computations that I have made for different commodities appear to confirm roughly this estimate. The thought in this connection is that possibly a disproportionate amount of attention has been given to transportation matters; second, on the whole the margins taken out by the wholesale trade are also very small in view of the important functions performed. The net profit per unit of goods handled is so slight that it is only on a large volume of business that a wholesale produce dealer

can make profits commensurate with those expected in other lines of production where equivalent amounts of capital, ability, and risks are involved; third, the most important single portion of the total spread between farmer and consumer is that taken by the retailer. In fact, from a large number of instances I have found that of the total spread between producer and consumer, the retailer takes on the average nearly one-half. In other words, the slice taken by the retail store on the average is nearly as large as the slices taken by local buyers, railroads, and wholesalers combined. This state of affairs is, of course, due to the high costs of retailing and not to the high profits of that branch of distribution. It also suggests that the marketing problem is very largely one of retail merchandising. It is the high cost of retailing that has undoubtedly made possible the development of coöperative stores in other countries, and led to the development of the mail-order house and the chain store in this country.

When the statement is made that there are too many middlemen, it may mean one of two things: either that there are too many classes of middlemen, i. e., too many successive steps; or that there are too many of each class, i. e., too many wholesalers, or too many retailers. While the splitting-up of the marketing process into a number of successive steps is largely a question of division of labor, as already pointed out, the question as to whether there are too many of each class is at least partially one of large-scale production, although other considerations are also involved. In the wholesale trade, we already have relatively large business units. In the retail trade, on the other hand, there are innumerable small stores scattered all over our large cities, and it is this fact that is so frequently condemned by those looking for a solution of the marketing problem.

Retail distribution is only beginning to be studied scientifically, and it is perhaps too early to come to any very definite conclusions as to the efficiency or possible improvement of the present system. There are two or three facts, however, that are worthy of consideration in this connection: Assuming that the cost of retailing would be lowered by eliminating the corner grocery store and concentrating the business in a few large stores, there appears to be no very practical way of bringing this about. As long as men (or women) with no experience in merchandising can eke out an existence by establishing and living in their little stores and delicatessens; as long as wholesale grocers and produce dealers will extend credit to such individuals; and as long as enough people will do at least part of their trading with the neighborhood store, just so long will the little corner grocery remain in existence. Second, it is not at all certain that greater concentration of the retail business would result in any lower cost of doing business, because I believe that it has been shown that in the large stores located in the heart of the city, the cost of doing business is higher than in the small corner grocery. This is due partly to the fact that certain

fixed charges like rent increase in greater proportion than sales, but more to the fact that these stores furnish superior and more expensive service the demand for which, on the part of consumers, is growing faster than their purchasing power.

Another consideration of interest in this connection is the manner of distribution adopted by the chain store, which is the most important recent development in the retail grocery trade. In Philadelphia alone, there are nine chain-store companies with a total of 1,260 grocery stores. It is claimed that they do over half of the retail grocery trade in the city. The chain store is an example of large-scale production in merchandising. It gains its economies through buying in large quantities; standardization of methods, store equipment, and products handled; saving in delivery and advertising; and saving of interest and losses by doing a spot-cash business. But the significant feature of this system is that it gets its distribution not through large, centralized, retail stores, but through innumerable small stores scattered throughout the city and even in the suburbs.

It may be considered by many that the arguments used up to this point appear to justify the present system of market distribution almost in its entirety. I have purposely refrained from alluding to the weak spots, however, because I feel that in order to obtain a sane view of the problem, it is necessary for us to obtain a clear conception of fundamental propositions herein set forth. Enough has been said perhaps to lead to the conclusion that there is ample economic justification for the fundamental aspects of present-day market organization, and that the solution of the marketing problem lies not in revolutionizing the present system, but in ferreting out its weaknesses, and applying remedies to cure these weaknesses. There certainly are defects in the marketing system, just as there are in our manufacturing and agricultural systems. These weaknesses can be discovered only by painstaking intensive studies of the methods and costs of marketing each product in turn, because where there is weakness in marketing one commodity, there is strength in the marketing of another. Although research in the field of marketing has not gone far enough to point out all the shortcomings of the present organization, certain weaknesses have been unearthed, many of which are not recognized by most of the casual observers who have delivered themselves of opinions with regard to the present system.

It is convenient to classify the defects of the present system under four heads, as follows:

1. Those connected with marketing at country shipping points.
2. Those connected with the transportation system.
3. Those connected with the wholesale trade.
4. Those connected with the retail trade.

In discussing these weaknesses, I shall not attempt to discuss those

of the retail trade or of the transportation system; but shall confine myself to those connected with marketing at country points, and the wholesale trade. The principal weaknesses of the system of marketing at country points are as follows:

1. Careless packing and lack of uniformity in packages.

2. Insufficient attention to quality of goods, to sorting before shipment, and to varieties produced.

3. Poor roads from farm to country shipping point.

4. Lack of knowledge of market conditions and prices on the part of farmers.

5. Poor business management on the part of local buyers, country stores, and farmers' organizations.

6. Lack of honesty on the part of both farmers and local buyers.

7. Abuse of monopoly power when there is one buyer, and price agreements when there are several buyers.

Some of the principal weaknesses of the organization and methods of the wholesale produce trade are as follows:

1. Opportunity for fraud and sharp practices. This is due largely to the fact that country shippers are not adequately represented in wholesale markets—a very important phase of the marketing problem.

2. Lack of adequate inspection systems. For some commodities, like grain, there are splendid inspection and grading systems, a function which has been taken over by the government in many states. For other commodities an inspection service is either inadequate or lacking altogether.

3. Wholesale markets are often poorly located, sometimes greatly congested, and often lacking in proper terminal facilities.

4. Lack of an adequate price-quotation system. For some commodities the methods of determining quotations have reached a high degree of development, while for others they are inadequate. Also the quotation systems in some cities are more efficient than in others. This whole question of quotations is of the greatest importance and interest. Whether a quotation should be determined by actual sales on an exchange, or by the vote of the whole exchange, or by a quotation committee of an exchange, or by outside market reporters is an unsolved problem, and practices vary greatly in different cities and in different trades. There has been much litigation with regard to the issuing of quotations by produce exchanges, and the New York Mercantile Exchange is being investigated at present by the Attorney General of New York State. One difficulty with the quotation problem is that the economic functions and value of market quotations, especially their use as "trading" or "selling" bases, has never been fully recognized and understood.

5. Lack of sufficient organization and means of obtaining and disseminating market information, resulting in uneven distribution of products

among the several markets with consequent gluts and scarcities. This weakness is greatly exaggerated by most writers, because it applies only to the highly perishable and seasonal products. In the grain, live-stock, butter, eggs, poultry, and other trades, the balancing of prices between different markets results in such an even and automatic distribution that the results can only excite our wonder and admiration.

6. Lack of standardization of methods, customs, grades, packages, trade terms, etc., in different markets.

It is only necessary to recite these various shortcomings of our present system to prove that the marketing problem is vastly complex, and that improvement can be brought about only by careful investigation along a number of lines and by the application of one remedy here, and another there. The object of this paper is to state the problem rather than to present a solution, but study of the subject has gone far enough at least to indicate in a general way the nature of some of the remedies. The most important may be classified broadly under four heads: first, coöperation, meaning a type of organization owned and democratically controlled by those who do business through it; second, voluntary associations among dealers; third, government regulation; and, fourth, education.

In this country coöperative organizations have developed mainly among producers, and hence have to do principally with marketing at country points. In some countries they have been carried to terminal markets and even into the export trade. In Western Canada, the farmers market a large part of their grain through their own organizations in the Winnipeg market. A few attempts are being made along this line in the United States, but the extent to which farmers' organizations should assume functions other than those connected with local marketing is a problem that needs careful consideration. Minnesota is far in the lead of all other states of the United States with respect to the development of coöperation among farmers. There are now over 1,000 coöperative marketing organizations in Minnesota, including creameries, which also manufacture, and in 1913 they marketed over $50,000,000 worth of farm products. The movement has been growing so rapidly in that state that it needs *direction more than encouragement*.

The part played by associations of dealers in regulating and improving the marketing machinery is not fully appreciated. In many instances such associations have fallen into disrepute because of monopolistic tendencies—sometimes real and sometimes imaginary. It is safe to say, however, that the most highly organized and efficient marketing organizations in the country are to be found among our produce exchanges.

The functions performed by such organizations in furnishing market places and trading facilities, adopting rules to prevent fraud, collecting and disseminating market information, and in providing systems of inspection

and grading, are invaluable to the economical marketing and even distribution of certain commodities. Such organizations are gradually extending their fields of usefulness, and they must not be overlooked either for what they have done in the past or for what may be accomplished by them in the future.

Many features of the marketing system can be dealt with efficiently only by the government itself. We already have state inspection of grain in many states, and federal inspection, or at least federal supervision, has become a live issue. We have state warehouse laws which govern the operations of grain elevators, and the operations of cold storage plants. Some states have laws which provide for the bonding and licensing of commission merchants, and which compel them to show their books in case of complaint. New York State has recently passed an apple-grading law, and she has also established a Market and Food Department to deal with marketing problems. Minnesota has adopted a state brand for butter, and other states are contemplating a similar move. Several states have passed special laws to make possible the formation of coöperative organizations. And so on. Government regulation is an important factor in the solution of the marketing problem.

Finally, these various remedies should be supplemented by education. The principles of marketing should be covered in every course in elementary economics; specialized courses in market distribution should be given in agricultural colleges and schools of commerce; the public should be educated to the fact that they have to pay for the elaborate services that they encourage and demand on the part of retailers; and business men should be educated in matters of efficient merchandising.

In connection with these remedies, public markets and direct marketing by parcel post and express should be mentioned. Public markets where farmers meet consumers have been given relatively more attention than they deserve. They never can play a very important part in the solution of the problem for the following reasons: Only an infinitesimal part of a large city's food supply can be grown within hauling distance; farmers who haul to market can not afford the time necessary to wait around a large part of the day to sell to consumers; a very small proportion of the housewives of a city can leave their children or their household or social duties to go to market; they are open only part of each year; and the competition of public markets can not reduce prices in retail stores as much as is commonly imagined because people in general are willing to pay for the superior service offered by the stores. Such public markets are good as far as they go and should be encouraged—especially certain modifications of them—but let us not be too optimistic with regard to their possibilities.

A similar thought might be expressed about the possibilities of direct marketing by parcel post or express. The quantity of farm products so

marketed is undoubtedly on the increase, but it will always be an extremely small proportion of the total volume. Several reasons might be given why direct marketing is not apt to develop on a large scale. While reading the bulletin, *Marketing Eggs by Parcel Post,* recently issued by the United States Department of Agriculture, I made a list of seventeen different things that farmers were told they must do, ranging from candling their own eggs to assuming losses from breakage, in order to make direct shipment a success. This bulletin, although written in an optimistic vein, furnishes the best of reasons why direct marketing of eggs can not develop on a large scale.

In conclusion, let me again call attention to the fact that economists have not only neglected these problems, but that they have not even gone into the matter sufficiently to know what the real problems are. Universities in our large cities have little realized the opportunities for valuable research work in the various wholesale trades at their very doors. And I can vouch for the fact that some of these problems are also very fascinating. It is not only a matter of collecting vast amounts of empirical data; it is also a matter of solving intricate problems, and most of these problems require a good sound knowledge of economics for their solution. A very few of our state universities have begun this work but the most important movement in this direction is the establishment of the Office of Markets in the United States Department of Agriculture, which has already begun just such painstaking investigations as I have suggested. The great need is to get down to the fundamental principles underlying the subject of market distribution. There is perhaps no field of economics in which the fallacious and misleading statements of uninformed writers and speakers go unchallenged by economists to such an extent. Happily the indications are that more adequate attention will be given to this important and interesting field in the future.

THE MARKETING OF LIVE-STOCK PRODUCTS IN MINNESOTA

By K. F. Warner

Meat, as the word is used here, refers to the food product of hogs, sheep, and cattle, with the exception of veal. Veal constitutes only one to two per cent of the total amount marketed and it varies so in weight, grade, and price that it was felt that the averages used below would be more accurate if it were excluded. Twin City meat is almost entirely a packing-house product and statistics indicate that a majority of all the meat, the country over, comes from the large centralized plants. The marketing of this product involves its passage from the crude form of live stock in the hands of the stockmen to the carcasses in the packing houses, and thence to the retailer and consumer.

Five courses are open to the farmer who has fat stock to sell: First, he may kill and dress his own stock and sell direct to consumers or country stores; second, he may sell to local butchers; third, to local stock shippers; fourth, he can ship his own stock; and, fifth, he can ship with his neighbors through a coöperative shipping association. Home dressing and curing of the meats is largely impractical, however, as few farmers have either the necessary equipment or training. When a man knows what his stock is worth and can get a local butcher to pay it, the second method of marketing saves expense and is entirely satisfactory. Such conditions are unusual, however, and both of the first two methods have a very limited field, as the supply in the producing sections is generally greater than the local demand, necessitating the seeking of an outside market. Thus, as local trade consumes but a small part of the stock produced, the farmer's marketing problem consists of finding the cheapest way to ship to South St. Paul, Chicago, South Omaha, or whatever general market is most accessible.

If a man has enough stock to fill a car, the best way is to ship it himself. This is done to a large extent in the principal stock-raising states and in certain parts of Minnesota. The expenses of the local buyer are saved and the owner may accompany his animals to market in person. Only a limited number can do this, however, as a considerable proportion of meat producers in the country are men who have but a few animals to market at one time and who, therefore, have to let some other person gather a carload here and there and ship for them. The local stock buyer

has done this, and in most instances has been of economic value to the small stockman. By buying a few head here and a few there, he has enabled the farmer to dispose of his stock as it becomes fat. Not only that, but the stock raiser has been saved the prohibitive freight expense of shipping only a few head at a time and of attending to business details of which individual farmers know but little. The disadvantages of this method are that the local buyer has to be recompensed for considerable time and risk involved in soliciting and handling shipments, and that such a buyer is too often able to take advantage of farmers who are ignorant of market prices.

Coöperative shipping associations are important features of the coöperative movement which has made such headway in the last few years. Sufficient stock to ship and proper management of the associations are the two things most essential to cheaper marketing through them. These associations combine the good points of the local buyer and individual shipping systems and obviate the disadvantages of both. By means of them the small grower can combine his offerings with those of his neighbors into full carloads and ship at carload rates. Efficient handling and selling are also possible if the right man is selected as manager. More might be added in favor of these associations but suffice it to say that while the local buyer handles stock on a margin of from fifty-five to seventy-five cents a hundred, the last report of the Coöperative Shipping Association of Litchfield, Minnesota, figured that it cost them thirty cents a hundred to sell cattle, thirty-two cents a hundred for hogs, and forty-seven cents a hundred for sheep. This margin includes all railroad and yard charges, and an assessment to cover association expenses and to provide a sinking fund.

Once en route to the stockyards live stock is handled in the same way whoever the shipper may be. Minimum weights for a thirty-six foot car are 22,000 pounds for cattle, and 17,000 pounds and 12,000 pounds respectively for single-deck cars of hogs and sheep. All weight in excess of the minimum adds proportionately to the minimum rate. State laws and federal regulations require that all stock be unloaded at least every thirty-six hours for feed, water, and rest.

It is often difficult to decide to which market stock should be consigned. In general, as it leaves the producing West and approaches the consuming East, its value rises. The rise is based, in the main, on the extra freight rate and on the estimated shrinkage in weight while in transit. Government figures show an average shrinkage for short hauls of about three per cent. If cattle were selling for ten cents a pound, the loss from shrinkage would be thirty cents a hundred or three dollars on a thousand-pound steer. Certain markets have specialties and pay more for certain grades of stock, but as a rule the Chicago price exceeds the prices of more western markets by the amount of the freight rate plus the extra shrinkage

of the eastern trip. Thus, cattle are normally worth about thirty to forty cents per hundred and hogs from twenty to thirty cents per hundred more in Chicago than in South St. Paul. The best and fattest stock usually find a stronger market in the East. The margin varies, however, and when a shipper has a choice of two markets, one further east than the other, he often plans to unload for rest at the nearer one, shipping East if he can not get a bid which suits. When located midway between two markets, as at many points in southern Minnesota and Iowa, and when the freight rate to them is the same the shipper is more apt to send his stock east. Thus, much of the stock of southern Minnesota goes directly to Chicago. South St. Paul, the principal live-stock market and packing center of Minnesota, draws principally from the North and West. Many of the better grades that stop there, however, are reshipped to eastern markets. Freight rates and the condition of each market at the particular time of shipping are the deciding factors in any case.

Marketing at the Stock Yards

To whichever market live stock is consigned, the marketing system that handles them upon arrival is practically the same. In the changing of live stock into meat and meat products, four things make a big plant more economical and efficient than a smaller one: It permits a more efficient organization for marketing; a more extensive division of labor in which each man becomes a specialist; a more economical and complete utilization of by-products; and a more efficient and less unwieldy government inspection service. The packers have, therefore, concentrated in a few cities which are favorably located with reference to transportation from production areas, and to consumption centers. There is a stockyards company at each market which is an independent organization, and which provides pens and other facilities near the packing houses where animals are received and cared for until sold. While under different managements and ownerships, the yards of one market are almost identical with those of another and practically the same system of selling is followed in all of them.

Although a packer may control the stockyards company through stock ownership, as at South St. Paul, it should be emphasized again that the latter is always a separate company with its own organization and officials. It owns the pens, yards, and equipment of the yards proper; it receives and reships the stock; provides a supply of feed and water; and weighs all animals for both buyer and seller. The commission firms are composed of men whose business it is to sell or buy for their patrons; they act principally as experienced salesmen, whose training and experience make them better able to transact business in the yards than the strangers who ship in the stock.

A load of cattle arrives on the Monday market, which is usually the strongest and largest. When hauled to the unloading platform, the stockyards company receives, unloads, counts, and yards it in the pens assigned to the consignees. Stock is not consigned to individuals but to commission firms operating in the yards. The pens are owned by the company and allotted to the commission firms, but rent is charged to the shipper as a per head yardage fee. Upon receiving the load, the commission man sorts it to the best advantage for selling, and supervises the feeding and watering until sold.

The buyers consist of five classes: the local packer who is buying for immediate slaughter; the buyer of a packing company who has no plant at that particular market; "order buyers," or those who are buying on orders from outside parties; the speculator or "scalper" who picks up bargains to resell; and, lastly, the stockman who comes to buy feeders. The buyers of the local packers and the feeder-buyers are the ones that really constitute the backbone of a market. The representatives of the outside packer, the order buyers, and the scalpers, are the ones who prevent violent fluctuations in prices and who tend to establish and hold the normal spread between different markets. If South St. Paul values decline more than those of Chicago, some scalper or packer's representative bids in to hold until prices rise or for shipment east, and these purchases strengthen the market. Thus, though Swift & Company have the only large plant in South St. Paul, they must bid in competition with other buyers who purchase for shipment to other markets. In Chicago one other class of order buyers makes a strong demand for good, heavy cattle. Orthodox Jews are not supposed to eat beef that has been killed over three days, and as a result many "Kosher" cattle, as they are called, are bought for shipment to New York on foot, this demand tending to keep up the price.

With these possible purchasers before him, the commission man plans how best to sort the cattle, and dickers with prospective customers, holding out for as much as he thinks he can get. Finally, a buyer rides into the pen and looks the stock over. "I'll give $7.90" (per hundredweight); "They're worth $8.15 to-day," the commission man replies. The buyer shakes his head and starts to leave. "Eight even," he calls back. "Eight and a nickel," the commission man concedes. "Weigh 'em," from the buyer, and the deal is over. No binding memorandum is made of the trade until night, when each sale is registered, together with price, name of firms, and weights. After the deal is closed, the cattle are run over the scales and weighed by the stockyards company. By means of a patent device, a cardboard slip is inserted in the scale and into it is impressed the weight of the load. Such recorded weights are accurate and official.

With weight and selling price at hand, the commission firm makes out

the check due the shipper on his load. Although the packers pay cash to the commission firms, the latter often mail checks to country shippers before they actually receive their pay from the packers. Fixed charges are assessed against each head of stock sold in the yards and consist of a commission, a fee for yardage, and one for feed. These together with freight, terminal charge, insurance, and inspection in case of hogs, are deducted by the commission men from the selling price of the stock before the check is remitted to the shipper, or deposited to the shipper's account, as the case may be.

Many loads come in and are sold by the firms to which they are consigned without the owner's being in or near the yards. Also many orders for feeders are filled by the commission men without the buyer's ever seeing the animals until unloaded on arrival. Considering, also, that the checks are made out and the charges deducted by the commission men themselves, it would appear that there is a good opportunity for fraud. In the first place, however, a firm will not get trade unless it has a good reputation, and since there is keen competition for shipments among commission men, there is every inducement to be square and to show as good results as possible. Second, the firms are combined into an Exchange with fixed rules to govern trading, and these rules are strictly enforced. Any man can get a chance to do business in the yards, but unless his reputation is good he will not be admitted to the Exchange, and the buyers can readily regulate their bids so as to prevent him from getting any business. To safeguard the shipper further, a $20,000 bond is given by each firm to the Exchange. With all these precautions, with the keen competition between firms, and with the speculators ready to steady the market, the shipper can be sure that these experienced men are able to procure more for his stock than he can get himself. Moreover, those who deal often in the yards consider the commission men as their friends and advisers, and in many instances the commission men advance money to them for buying feeders.

Market Classes and Grades

Such, in short, is the yards system. All animals that pass through the market are sold according to the classes and grades to which they belong. The classification is based on the use to which the animals will be put, this being determined chiefly by their sex, age, weight, form, quality, and condition. The grades within the classes run from prime and choice to inferior, and represent the different degrees of excellence in quality, condition or fleshing, and form. The classifications are comparatively uniform at the various live-stock markets and similar grades with some local variations are used as the basis of published quotations at leading market centers.

Cattle are divided into seven general classes, the first five of which consist of animals which are ready for slaughter. The first one is called "beef cattle" and includes only fattened steers that may be sold as carcass "beef." "Butcher stock" consists of the inferior steers and all the cows and heifers except the very poorest. These latter are called "cutters," "strippers," and "canners," and are the old, thin animals which are fit for little but boneless cuts, canned and cured meats, and sausage. The fourth class, which is made up of "bulls," is used mainly for sausage, though the younger and better ones are often sold as dressed beef or beef cuts, in which case they are classed as butcher stock. The fifth division includes calves and is known on the market as such. The last two classes are called "stockers" and "feeders" and include thin cattle, both male and female, which are sold to feeders for further fattening. The "stockers" are younger and generally weigh under seven hundred pounds, while the "feeders" are older and heavier.

About sixty per cent of the sheep killed at the packing centers are not called sheep but "lambs." Both males and females are called "lambs" from the spring of their birth until early summer the next year, though the larger "natives" are often too heavy for "lamb" carcasses when only ten to twelve months old. At that time the earlier-maturing ewe lambs pass over into the "ewe" class, which is composed of all females fit for killing but too old to grade as lambs. The wethers, which mature more slowly than the ewes, are known as "yearlings" from their second summer until about two years old. Just above the pastern joint of the sheep is a flat joint or suture where the bone is joined, top and bottom, by a finger-like dovetailing. This "flat" or "lamb" joint will "break" in lambs and yearlings and is a sure means of telling young carcasses from ewes, wethers, and the other older classes. Wethers that have passed the age limit for "yearlings" are known as "wethers" and with the addition of "bucks" and "stags" conclude the killing classes. Feeder "lambs," "ewes," and "wethers" are comparable to the "stockers" and "feeders" of cattle.

Hogs are less closely classified than other kinds of stock. "Butcher hogs" are mainly barrows and correspond to "beef cattle." "Packing hogs" contain the rougher, less uniform grades and include old brood sows and the like. As their name implies, they are used mostly for "packing" or, in other words, for smoked, dry salt, or barreled pork. "Light hogs" average from 125 to 220 pounds and make the better grades of bacon and fresh pork. The "pigs" are the younger animals weighing less than 125 pounds. After them come the "boars," "stags," "roughs," and other odds and ends.

Prices paid and quoted on these classes are based chiefly upon the killing value of the animal. Thus, "canners" sell below "beef cattle" because they will dress out a smaller proportion of valuable meat; and stock-

ers are worth less than feeders because they require more time and feed to put them in condition for slaughter.

Many people fail to understand the fluctuation in live-stock prices and lay the blame at the door of packer monopoly and manipulation; but to a large extent, at least, the market is subject to the law of supply and demand. The packer's buyer goes on the market in the morning with instructions to buy a certain number of head of various kinds. If the receipts of animals desired by the packer are light, his purchases naturally "bull" the market; if the receipts are heavy, the buyer holds off and makes his purchases at the lowest price possible. The average market price is generally lower in the fall, as that is the time of year when the range "grassers" and the hogs and pasture lambs pour in. Likewise feeders are high when the pasture season opens and June always shows a scarcity of "beef cattle."

Excluding "stockers," "feeders," and "calves," the average quotation for cattle at South St. Paul in 1913 was about $6.25 per hundred. Hogs sold for about $8.10 per hundred and sheep for $6.00 per hundred. These are the prices that the packer paid but are not the net values that the producer received because the latter pays the freight and selling fees as mentioned above. To lay down one hundred pounds of cattle at South St. Paul costs the average Minnesota shipper about fifteen cents for freight alone. The freight on hogs averages about sixteen cents per hundred and that on sheep about seventeen cents. Switching charges at South St. Paul are $2.50 per car.

Yardage fees are 25 cents per steer, or nearly 2.5 cents per hundred; hogs, 8 cents per head, or 3.5 cents per hundred; and sheep, 5 cents per head or about 6 cents per hundred. Feed costs from 2 to 3 cents per hundred pounds live weight. Commission fees for selling are $10.00 per 22,000-pound car of cattle, or 4.5 cents per hundred; hogs, $8.00 per 17,000-pound car, or 4.7 cents per hundred; and sheep, $8.00 per 12,000-pound car, or 6.7 cents per hundred. Totaling the expenses and subtracting them from the average selling price leaves the producer a net price on cattle for 1913 of about $6.01; hogs, $7.83; and sheep, $5.66. These prices were received, however, only when producers shipped direct in car lots. If handled through a shipping association or sold to a local buyer, the net prices received by the producer would be less. Shrinkage is also of so varying a quantity that it has been omitted even though it is unavoidable expense. The approximate prices paid by the packer, however, during 1913 were $6.25, $8.10, and $6.00 respectively as stated above, and these prices will be used herein as the bases on which packers' costs and profits will be figured.

TABLE I

AVERAGE COST OF MARKETING 1000-POUND CATTLE, 230-POUND HOGS AND 80-POUND SHEEP FROM COUNTRY SHIPPING POINT TO AND THROUGH THE SOUTH ST. PAUL STOCK YARDS

	Freight per head*	Switching		Commission		Yardage per head	Feed per head	Total per head
		per car	per head	per car	per head			
Cattle	$1.50	$2.50	$0.11	$10.00	$0.45	$0.25	$0.12	$2.43
Hogs	.37	2.50	.03	8.00	.11	.08	.03	.62
Sheep	.14	2.50	.02	8.00	.05	.05	.01	.27

* Rough average rate for Minnesota shippers to South St. Paul.

THE PART PLAYED BY THE PACKER

Stock bought by local packers is immediately driven into the waiting pens for water and rest. Long inclined chutes lead them thence to the killing beds located near the top of the packer's plant. On the killing floors of the larger houses the labor is divided, each man having a single task in which he becomes an expert. In the cattle crew, for instance, there are the "knockers," "hoisters," "stickers," "headers," "leggers," "siders," "backers," "splitters," "washers," and so on in endless succession. The carcasses are run on overhead rails into large cooling rooms, while the hides, fats, and offal are moved downward from the killing beds and distributed to the different parts of the plant where again there is a man for almost every task. The chilling, cutting, curing, and otherwise preparing of the various meats, and the manufacture of many meat products and by-products is not only an important branch of the packing business, but constitutes a large part of the whole industry. A selling department solicits orders and a freight crew fills them, passing both meat and by-products on to the packers' distributing houses and "route cars" and thence to the retailer.

In 1913 when cattle cost the packers around $6.25 per hundred, they were wholesaled by them in carcass form at about $11.50 per hundred. Hogs cost about $8.10 and pork wholesaled at $12.50. Sheep cost $6.00 and the carcasses wholesaled at $11.90 per hundred. Is the service rendered by the packer to the consumer commensurate with this margin in the price of meat? In figuring the selling price from the live cost a packer must consider what is known as "dressing per cent." The cattle slaughtered at South St. Paul reappear as carcasses that average only about fifty-one per cent of the live weight. We, as consumers, buy meat only. In addition to the meat, the packer in buying cattle, buys head, legs, hide, and offal, which total about forty-nine per cent of the live weight. The $8.10 paid out per hundredweight for hogs buys seventy-seven pounds of pork and thirty-three pounds of by-products. Sheep average forty-seven per cent

carcass and fifty-three per cent of by-products. Considering this factor and omitting the value of the by-products, a one-thousand-pound beef animal that cost $6.25 per hundred, or $62.50, produces a carcass that cost $62.50 but weighs only 510 pounds and therefore has a dead cost of $12.25 per hundred, or more than the carcass sells for. At the live-cost figures used here, the dead cost of hogs is $10.50 per hundred and of mutton $12.75 per hundred. These figures are summarized as follows:

TABLE II
COST TO THE PACKER

	Cost per cwt.	Dressing per cent	Price paid by packer per cwt. of carcass
Beef	$6.25	51	$12.25
Pork	8.10	77	10.50
Mutton	6.00	47	12.75

TABLE III
PACKER'S SELLING MARGIN PER HUNDREDWEIGHT

	Dead cost	Selling price	Margin on carcass alone
Beef	$12.25	$11.50	−$ .75
Pork	10.50	12.50	+ 2.00
Mutton	12.75	11.90	− .85

Referring to Tables II and III it can be seen that carcass beef and mutton are sold for less than was paid for the live animal, while pork alone, which is much better adapted to curing, sells for more than the dead cost.

Another expense that the consumer fails to consider is condemnation. From one-half to two per cent of all the cattle, hogs, and sheep killed at the packing centers are condemned for disease and "tanked." The proportion varies from one-half to six per cent, but the above is the general average. Packer buyers watch this closely when buying, but whatever receives the "U. S. Condemned" on the killing floors is valuable only for tankage and fertilizer.

Packers sell and distribute in cities through their own jobbing or wholesale houses. Meat is sent out from the coolers to the various branches and distributed through them, rather than directly to the local retailer. Swift and Company have the only large packing plant in or near the Twin Cities, but Armour, Cudahy, Morris, Sulzberger and Sons, Hormel, McMillan, and other packers have their own distributing stations in St. Paul

and Minneapolis. So general and systematic is this wholesale distributive system and so large a part of the nation's meat passes through it, that competition largely equalizes wholesale prices throughout the country. Other firms compete with Swift and Company in the Twin Cities and Swift competes with them where they have the shipping advantage. However, conditions often vary; the New York market is sometimes lower than the Chicago market; St. Paul pays almost the same as Duluth, and Chicago patrons at times pay the same for home-killed meat as does Philadelphia for Chicago meat. Wholesale prices on the same grade vary but little at different points, and freight bills and selling expenses, to a certain extent, are paid by all rather than the distant few. Selling expenses are necessarily large but probably no more so than in any other large business of similar scope.

The packer, then, stands the loss in shrinkage and condemnation, pays the expenses of his help from buyer to seller, supplies and operates his equipment, and sells carcasses of beef and mutton for less than they cost. The explanation of this apparent anomaly of course is to be found in the value of the by-products. The weight and value of by-products from a thousand-pound steer, a 230-pound hog, and an 80-pound sheep at South St. Paul are approximately as follows:

TABLE IV

By-product	Weight and price	Value
CATTLE:		
Hide	65 lbs. at 16c	$10.40
Head, legs and feet		.40
Heart	3 lbs. at 6c	.18
Liver	9 lbs. at 8c	.72
Tongue	3 lbs. at 12c	.36
Fats	18 lbs. at 7½c	1.35
Casings (rounds)	7 lbs. at 5½c	.37
Casings (middles)	4 lbs. at 6c	.24
Bung		.25
First and second stomach	18 lbs. at 3c	.54
Miscellaneous		.25
Total		$15.06
By-product	Weight and price	Value
SHEEP:		
Heart	½ lb. at 6c	$0.03
Tongue	¼ lb. at 12c	.03
Pelt		.75
Head		.05
Fats	1½ lbs. at 6c	.09
Casings	⅛ lb. at $1.00	.20
Paunch and miscellaneous		.05
Total		$1.20

By-product	Weight and price	Value
Hogs:		
Heart	¾ lb. at 6c	$0.05
Liver	2 lbs. at 10c	.20
Tongue	½ lb. at 10c	.05
Fats	8 lbs. at 3c	.24
Head, cheek off		.15
Casings		.15
Paunch	½ lb. at 20c	.10
Ears and snouts		.05
Miscellaneous		.10
Total		$1.09

The total receipts for the stock bought by the packers would thus figure up to about $73.71 for a thousand-pound beef, $23.22 for an average 230-pound hog, and $5.67 for an average 80-pound sheep.

The costs of buying, "packing," selling, and distributing are difficult to get. Swift and Company's report on their 1912 business shows the distribution of one dollar's worth of sales as follows:

For live stock	$0.80
For labor	.08
For freight	.05
For other expenses	.04
For profit	.03
	$1.00

The same company goes on to state that its profit on fresh meat in 1912 was one fifth of one cent per pound. Whether or not these figures are representative, it is evident that the packers represent a high degree of efficiency in manufacture and distribution; that the net profit per unit of sales is small; and that it is chiefly because of a rapid turn-over and a vast volume of business that they are enabled to make substantial net profits on a year's business.

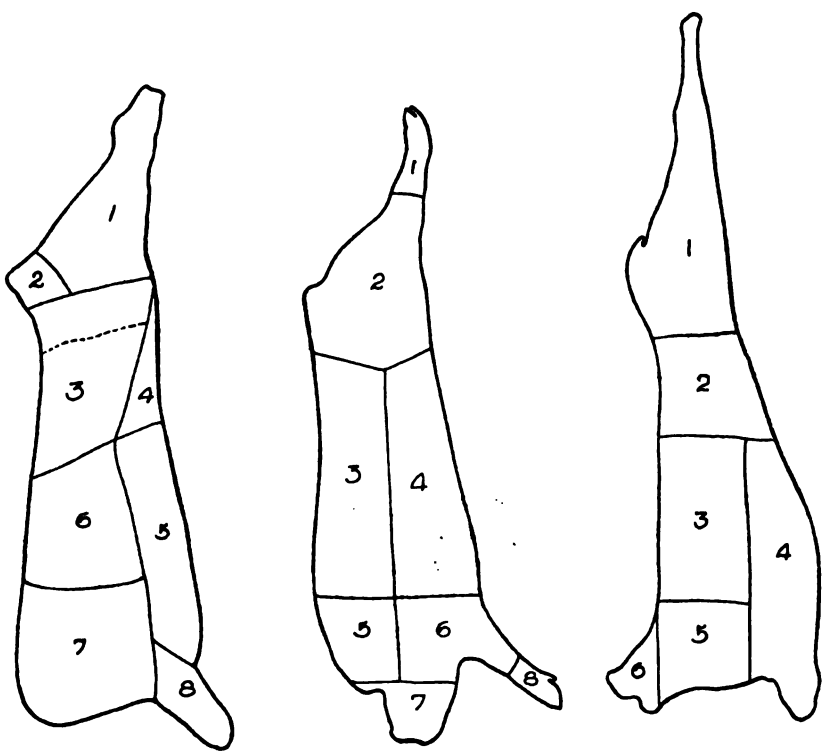
The Retail Trade

Retailers in the larger cities commonly buy their meat by personal inspection in the "coolers" of the packers' local supply houses. Packer salesmen solicit business, but few butchers buy much meat without seeing it. Carcasses are often shipped to the branch house when only two or three days old, too "green" to be suitable to sell. Those selected by the butcher

are marked and left to hang seven to fourteen days before delivery. During that time acid formation in the tissues softens the tough fibres and adds flavor.

Four problems confront the retail butcher in ordering meat and in determining his selling price: What grade of meat shall he buy; what cuts will move the best; what does each cut cost per pound; and what price must he charge above that to include expenses and profit? The quality of meat that a shop can sell depends on its location. Prosperous communities buy the better grades, such as prime steers. Workingmen's communities consume more cow beef. Some downtown shops trade with all

Diagram Showing the Various Wholesale Cuts of Meat



Steer Carcass:	Hog Carcass:	Lamb Carcass:
1. Round	1. Foot	1. Leg
2. Rump	2. Ham	2. Loin
3. Loin[1]	3. Loin	3. Rack
4. Flank	4. Bacon	4. Stew
5. Plate	5. Butt	5. Shoulder
6. Prime Rib	6. Shoulder	6. Neck
7. Chuck	7. Cheek	
8. Shank	8. Foot	

[1]Above dotted line, sirloin; below, porterhouse.

classes and sell both grades. The tastes of different cities also vary, and Minneapolis is said to be more of a "cow town" than St. Paul. The same thing holds true with regard to cuts of beef. A carcass is composed of several cuts, each having a different character, a different demand, and a different value. Shoulder cuts contain considerable bone and are apt to be rather tough; rib is good, and adapted to roasting. The loin furnishes the choicest cuts and, together with the round, can be best sold in that popular American style, steak. If a butcher were to cut a side of beef and sell it all at the same price, the choicer parts would be taken up immediately, while the poorer cuts would be unsalable. To move the whole, then, the butcher raises the price of the more popular cuts and lowers it on the others, until economy induces part of the trade to take the "boils" and "stews." The class of buyers again makes a difference in the cuts a shop can handle. When they all are well-to-do, price gives way to palate and only good cuts move. If a shop were to buy straight cattle in such a district it would soon be loaded up with "chucks" and "plates," while if located among less prosperous people the "loins," "rounds," and "ribs" would move more slowly. It is of interest to note, however, that porterhouse and loin chops are often demanded by people who can ill afford them. Poor loin steaks have the preference over good chuck regardless of price. To balance these differences the jobbing houses cut some carcasses themselves and distribute "chucks" or "loins" as the trade demands. As a result, the wholesale prices of different cuts also vary.

Sheep and lambs are usually sold to retailers as whole carcasses, though cuts are quoted on most of the markets. Cattle cuts are numerous though much less so than those of hogs. Much of the pork that is sold is first pickled, smoked, or rendered, operations which the big companies can do more cheaply than the retailers. A few dressed hogs are sold, especially in the winter, but cured and smoked meats, fresh loins, and some fresh shoulders and hams are the principal pork products that are sold to retailers, pork loins being the principal fresh-pork product. Thus, even though a butcher buys whole carcasses, he must consider the relative cost of each when he figures out the selling price. The following tables[1] show the *cost* to the retailer of the various cuts at different carcass prices. Cutting methods vary in different places and these percentages are not exactly the same as those used before, but they show, in general, the butcher's problem.

With the meat in the shop and the cost figured out, the question then is, What must be added to cover expense and profit, and which cuts will carry the most per pound? Few people realize the expense of a small

[1] These tables are a modified form of similar tables that appeared in a booklet published by the Moneyweight Scale Company of Chicago, Ill.

TABLE V

APPROXIMATE COST PER POUND TO THE RETAILER FOR THE DIFFERENT CUTS OF BEEF, PORK, AND MUTTON AT DIFFERENT WHOLESALE PRICES OF WHOLE CARCASSES

Beef

	Per cent of total wgt.	Cost 9 cts.	Cost 9½ cts.	Cost 10 cts.	Cost 10½ cts.	Cost 11 cts.	Cost 11½ cts.	Cost 12 cts.	Cost 12½ cts.	Cost 13 cts.	Cost 13½ cts.	Cost 14 cts.
Round	13	.12	.12¼	.12¾	.13¼	.14	.14¼	.14½	.14¾	.15	.15¼	.16
Loin	16	.16	.16¾	.17½	.18	.18¼	.18½	.18¾	.19	.19¼	.19½	.20¼
Rump rst.	6	.09¼	.09½	.09¾	.10¾	.12	.12½	.13½	.14	.14¾	.15½	.16
Back r'nd.	3	.08	.08¾	.09½	.10	.10	.10½	.11½	.12	.12½	.13	.13¼
Flank	4	.04	.04	.04	.04	.04	.05	.05½	.06½	.07½	.08	.08½
Suet	2	.04¾	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Shank	7	.01½	.01½	.02	.02	.02	.03	.04	.05	.06½	.07½	.08½
Ribs	12	.12	.12¾	.13¾	.14¼	.16	.16½	.17	.17¼	.17½	.17¾	.18
Plate	11	.05½	.06	.06½	.06½	.06½	.07	.07½	.08	.08½	.09½	.10
Chuck	22	.08	.08½	.09	.09½	.10	.10½	.11	.11¾	.12½	.12¾	.13¼
Neck	2	.04¾	.05	.05	.05	.05	.06	.06½	.07½	.08½	.09	.09½
Waste	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	100											

Pork

	Per cent of total weight	Cost @ 7 cts.	Cost @ 8 cts.	Cost @ 9 cts.	Cost @ 10 cts.	Cost @ 11 cts.	Cost @ 12 cts.
Ham	19	.10	.11¼	.12¾	.13¾	.14	.14½
Shoulder	16	.06½	.07¼	.08¾	.10	.11¼	.12
Loin	12	.08	.08¾	.10	.11¼	.12¾	.14½
Bacon bellies	11	.10	.11¼	.11¼	.13½	.14½	.15
Back fat	15	.06½	.07¼	.08	.08¾	.10	.12
Leaf lard	4	.08	.08¾	.10	.10	.12	.13¾
Head	7	.04	.04	.04¾	.05¾	.06½	.07¼
Feet	3	.01¾	.01¾	.01¾	.04	.04	.04
Trimmings	8	.05¾	.06½	.07¼	.08	.08	.08¾
Spare ribs	2	.06½	.07¼	.08	.09¾	.10½	.12
Neck bones	2	.03	.04	.04	.04¾	.05½	.05½
Waste	1	.....	.....	.....	.....	.....	.....
	100						

Mutton

	Per cent of total weight	Cost @ 12 cts.	Cost @ 13 cts.	Cost @ 14 cts.	Cost @ 15 cts.
Leg	25	.14	.14¾	.16	.18
Chops	36	.16	.17	.18	.20
Shoulder	15	.10	.11¼	.12	.12
Breast	12	.08	.08	.10	.10
Neck	6	.06½	.06½	.06½	.06½
Waste	6	.....	.....	.....	.....
	100				

shop and there follows a list of the approximate expenses of a typical shop, compiled from figures taken in the Twin Cities and checked against those published in the report of the New York Mayor's Market Commission:

TABLE VI

ANNUAL EXPENSES OF A TYPICAL BUTCHER SHOP

Rent at $75		$900.00
Repairs		60.00
Interest on $2,000 capital at 6 per cent		120.00
Postage, printing, etc		100.00
Advertising		25.00
Salaries and wages:		
Proprietor at $100 per month	$1,200.00	
Butcher at $16 per week	832.00	
1 boy at $10 per week	520.00	
		2,552.00
Horse and wagon at $25 per month		300.00
Ice		300.00
Sawdust		25.00
Telephones (2 at $4 per month)		96.00
Lights		50.00
Sharpening saws, cleavers, etc		40.00
Paper, twine, and skewers		75.00
Depreciation on equipment		40.00
Incidentals		250.00
Total		$4,933.00

A shop with these expenses would do an annual business of about $20,000, so that the cost of doing business is about 24.7 per cent of the gross sales.[2] A carcass of beef costing the butcher $11.50 per hundred must therefore be sold for $15.28 per hundred in order that he may come out even.

The practices vary in different shops; certain large expenses such as rent, interest, etc., are common to all, while others may not appear. Paper is often not considered an expense because some weigh it with the meat. Laundry-work has not been included, although the total would be around seventy dollars annually, as many butchers require the men to pay for their own laundry. Also many butchers do not include regular salaries for themselves. One of the most important items is for the delivery boy and horse, which together figure up to $820, or about twenty-two per cent of the

[2] The data at hand are insufficient to conclude that 24.7 per cent is an accurate average for all retail butcher shops of the Twin Cities. The cost varies, of course, in different shops. It will be noticed that the proprietor's salary is included at $100 per month. If this had not been included, as is common with many shops, the cost of doing business would figure only about 18.7 per cent.

whole. Whether the delivery should be abolished or not is another question. While it is in existence, the consumer must pay for it and it goes down as the next largest item outside of rent and proprietor's own salary.

After his shop expenses comes the item of waste. While not so true with pork, as fewer whole carcasses are bought, there is considerable waste with beef and mutton. Pieces of bone or tallow are frequently cut off before weighing and the price of the amount sold must be high enough to pay for them. Then, too, there is always a certain amount of meat lost in a shop. A piece which goes out on the wagon may not prove to be what the customer ordered and may be returned. After a half day in the sun the chances are against its keeping. Some pieces move very slowly and there are always stale odds and ends which represent either a sacrifice or a total loss. Figures obtained from a number of Twin City butchers indicate that the amount of meat actually lost in a shop, together with the bone and trimmings which find their way into the fat box, constitute nearly ten per cent of the total amount handled by the shop. This fact enables one to understand why the butcher hates to cut off even a tenth of a pound of fat and bone from a two-pound steak. As indicated, however, this ten per cent waste is not an entire loss. Part of it can be used for sausage and sold at a profit. The bones and rough fat are bought by rendering plants for one to two-and-one-half cents a pound. The rest, however, is total waste and includes shrinkage in weight, spoiled pieces, bloody spots, and those mysterious odds and ends which no one can account for. In the better class of shops meat is often trimmed before being weighed for the customer. The price, however, is correspondingly higher in these shops than in those where all purchases are weighed untrimmed. The prices included in later tables are taken as the average of all classes of shops. The "waste," therefore, does not include the total amount of bone, trimmings, etc., but is restricted to that per cent which is almost absolute loss.

The expense of the credit system averages from one to two per cent of the gross sales. Interest on the money, extra trouble, and bad debts make an additional burden on each pound of meat. Some maintain, however, that the trade and satisfaction that it brings pays for its extra cost.

Before making out his prices a butcher must also consider the seasonal variation. A short study of the curves plotted on the accompanying diagrams shows the variation that occurs at different months of the year. The figures used are all Chicago figures for 1913. These were used as they were more complete, accurate, and comparable than any others obtainable. Cattle, for instance, show fairly strong in January, sink in February when the renters are moving and unloading their stock, move back and forth through the spring, reaching the high mark usually in June when most of the farmers are feeding their stock on grass. Fall, with its run of grass

and range stock, always brings a slump, although the demand for winter feeders in September generally tends to strengthen it. The curves representing the few wholesale figures that were obtainable show that these prices like those of the cattle fluctuate frequently. These fluctuations correspond in the main to those of the live animals.

It is when the retail figures are reached, however, that the biggest

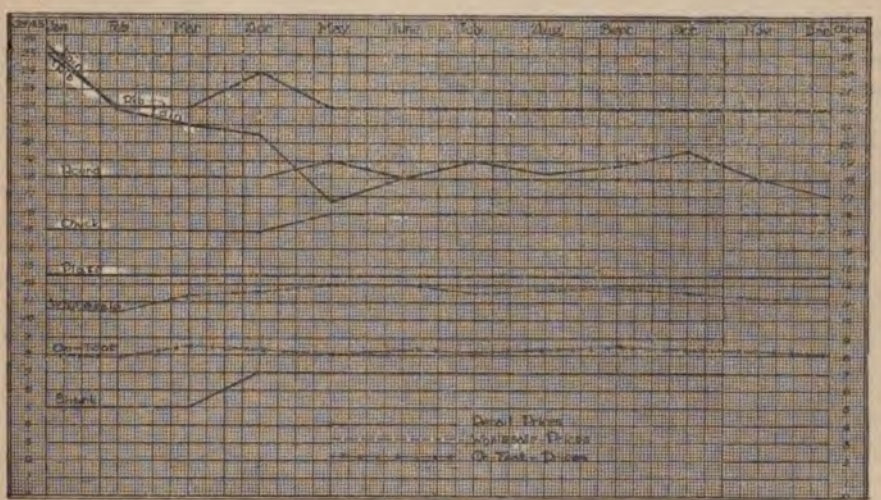


Diagram Showing Average Monthly Prices of Cattle, and Wholesale and Retail Prices of Beef in Chicago, 1913

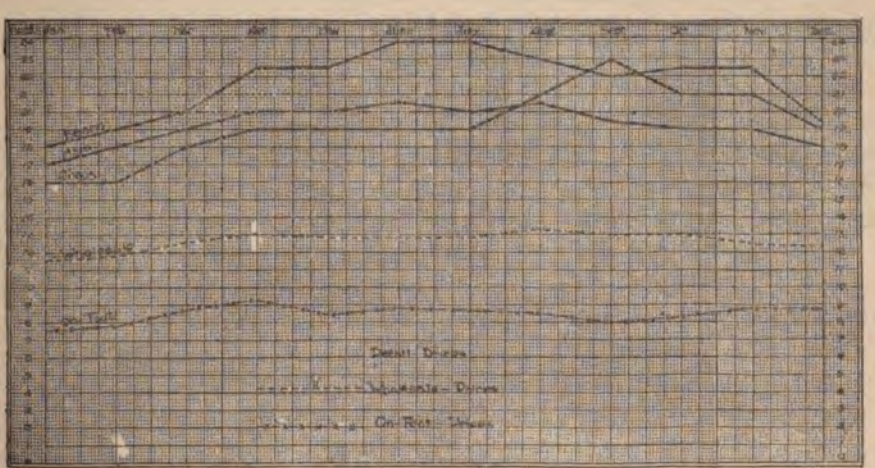


Diagram Showing Average Monthly Prices of Hogs, and Wholesale and Retail Prices of Pork in Chicago, 1913

change is noted. Some cuts vary in accordance with the price on foot, while some do not vary at all. Studying the curves of all the classes of meat reveals these facts: First, fluctuations are fewer in retail prices than in the other two; second, prices on the cheaper cuts tend to remain stationary; and, third, prices of the higher-priced cuts vary in general accordance with the price of live stock, but their fluctuations are more violent than those of the prices upon which they are based.

These facts suggest the following conclusions: First, retail prices do not vary in strict accord with the cost price; and, second, since they must cover both the original cost of the meat and the expenses of doing business, the margin between them and the buying price must be wide

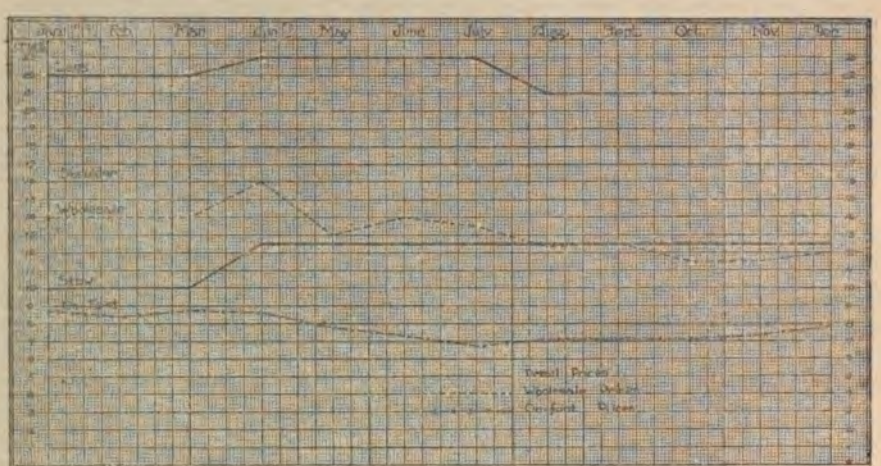


Diagram Showing Average Monthly Prices of Lambs, and Wholesale and Retail Prices of Lamb in Chicago, 1913

enough to permit minor wholesale fluctuations without seriously affecting the butcher's margin. The consumer is willing to pay twenty-one cents for twenty-cent beef one day and twenty-one cents for twenty-two-cent beef the next rather than to pay the actual varying cost. Of course, such a system does not keep the retailer's margin absolutely constant and it is perhaps more often too high than too low. Nevertheless it saves trouble with the consumer and makes a fairly stable basis for the shop men to work upon. In some of the large shops price lists are made out four times a year and printed for the shop men to learn. Corrections are added here and there but the bulk of the list remains fixed regardless of the daily swings of the live-stock market.

Furthermore, it is apparent that the curves representing the cheaper cuts are nearly straight lines, while those of the higher cuts vary more fre-

quently and often violently. It may be concluded that the demand for cheap meat is fairly steady. Of more importance than that, however, is the fact that only part of the prices can be controlled by the butcher. People will indulge in loin and rib if they can afford it, and they will buy chuck and plate only when the prices are low enough to be an inducement. Applying the lever where the strength is the greatest, or "charging what the traffic will bear," is the retailer's solution. We thus find the poorer meat fairly constant in price, while the better cuts vary enough to maintain the gross margin for the whole. Thus the seasonal variation, such as the scarcity of meat in the early summer and the demand for small, frying cuts instead of the boils and roasts, tends to raise decidedly the price of loins and rounds, while it affects the cheaper cuts very little.

TABLE VII

APPROXIMATE AVERAGE RETAIL PRICES OF BEEF, PORK, AND MUTTON IN TWIN CITIES FOR 1913

Beef

Cut	Price	Per cent of total weight	Retail price on basis of 100 lbs.
Rib	$0.19	9.5	$1.81
Loin	.26	17.5	4.55
Round	.20	24.0	4.80
Chuck	.15	22.0	3.30
Plate	.10	13.0	1.30
Flank and shank	.07	9.0	.63
Suet	.04	3.0	.12
Waste	....	2.0	....
Total	.....	100.0	$16.51

Pork

Cut	Price	Per cent of total weight	Retail price on basis of 100 lbs.
Chops	$0.19	12.0	$2.28
Shoulder	.14½	8.0	1.16
Butts	.17	6.0	1.02
Spare ribs	.13	2.0	.26
Ham	.19½	21.0	4.10
Bacon	.21	21.0	4.41
Lard	.12	12.0	1.44
Neck, bone, feet, etc.	.04	4.0	.16
Trimmings	.11	13.0	1.43
Waste	.....	1.0	.....
Total	.....	100.0	$16.26

TABLE VII—*Continued*

Mutton

Cut	Price	Per cent of total weight	Retail price on basis of 100 lbs.
Legs	$0.18	31.0	$5.58
Shoulder	.14	16.0	2.24
Chops	.23	30.0	6.90
Stew	.08	18.0	1.44
Waste	.....	5.0	.....
Total	.....	100.0	$16.16

All these facts have to be considered by the retailer in determining the cost of each pound of meat: first, the relation to the total expenses; second, the price to be charged on each pound in order to come out even; and, third, the cuts that can carry the biggest load. The retail prices charged in the Twin Cities in 1913 for all cuts of meat have been collected and averaged, and are shown in the foregoing table. Grades vary considerably, although enough firms have been included to make the average representative.

The following table summarizes the preceding figures, and compares the prices on foot, at wholesale, and at retail, all on the basis of one hundred pounds.

TABLE VIII

AVERAGE PRICES OF CATTLE, HOGS, AND SHEEP IN TWIN CITIES FOR 1913

	On foot	Wholesale price	Retail price
Beef	$6.25	$11.50	$16.51
Pork	8.10	12.50	16.26
Mutton	6.00	11.90	16.16

The absolute figures as shown above are of less concern to the average consumer than are the justice and fairness of the margins. He will pay $16.51 for one hundred pounds of beef if it costs that much to produce it, but the thing that causes most of his complaints is the fear that someone in the selling chain is getting more than his share. The following tables give a summary of prices on foot, at wholesale, and at retail:

TABLE IX

SUMMARY OF MARKETING COSTS AND MARGINS FOR A 1,000-POUND BEEF, A 230-POUND HOG, AND AN 80-POUND SHEEP

From Farmer to Packer

	Received by farmer	Freight commission, yardage, etc.*	Paid by packer	Per cent received by farmer
Cattle	$60.07	$2.43	$62.50	96.1
Hogs	18.01	.62	18.63	96.7
Sheep	4.53	.27	4.80	94.4

From Packer to Retailer

	Packer pays	Packer's gross margin	Packer receives			Packer's margin (per cent of selling price)
			Carcass	By-products	Total	
Cattle	$62.50	$11.21	$58.65	$15.06	$73.71	15.2
Hogs	18.63	4.59	22.13	1.09	23.22	19.8
Sheep	4.80	.87	4.47	1.20	5.67	15.4

From Retailer to Consumer

	Retailer pays	Retailer's gross margin	Consumer pays	Retailer's margin (per cent of selling price)
Cattle	$58.65	$25.55	$84.20	30.3
Hogs	22.13	6.67	28.80	23.2
Sheep	4.47	1.61	6.08	26.5

* These figures represent the bare cost which would be involved by a producer in shipping direct in car lots. If sold to a local buyer or shipped through a coöperative association, the cost would be higher and the net amount received by the farmer (first column) correspondingly lower. Shrinkage also has not been subtracted from amount received by the farmer.

The figures for cattle may be interpreted as follows: During 1913 the average price brought by 1,000-pound cattle at South St. Paul was $6.25 per hundred, or $62.50 apiece. The average cost of selling such an animal from farm to packer was $2.43, thus netting the producer $60.07, or 96.1 per cent of the selling price.[3] The packer paid $62.50 for the beef and sold the 510-pound carcass for $11.50 per hundred pounds, or $58.65. The $3.85 deficit, the cost of handling, and the profit were covered by receipts from the by-products, which had a value of $15.06. In other words, the packer sold his $62.50 beef for $73.71, retaining a margin of $11.21, or 15.2 per cent of his selling price. The retailer paid the packer $58.65 for the 510-pound carcass, and sold it for $16.51 per hundred pounds, or

[3] See footnote to Table IX.

$84.20, realizing a margin of $25.55, or 30.3 per cent of selling price. The figures for sheep and hogs may be interpreted in the same manner.

Although the packer sells beef and mutton carcasses for less than what he pays for the live animals, the hog carcass brings more than the cost of the live animal. The reasons for this are that the hog carcass constitutes a larger proportion of the live weight, that hog by-products are of relatively small value, due especially to the absence of a valuable pelt or hide, and that hog products are raised more in value by the manufacturing process, due to the cutting-up of the carcass and the curing, smoking, and storing of certain parts. When the receipts from by-products are included, it will be seen from the table that the packer receives margins of 15.2 per cent on cattle, 19.8 per cent on hogs, and 15.4 per cent on sheep, all of which are reckoned on the packer's selling price.

Are these margins too large? Swift and Company's figures, as quoted before, place the cost of stock as eighty per cent of their total selling price. The figures presented herein are slightly higher than eighty per cent, but this may be accounted for by the fact that greater values are realized from highly manufactured by-products, whereas only the values of the crude by-products are used here. Out of his margin ranging from 15.2 per cent on cattle to 19.8 per cent on hogs, the packer must pay his operating expenses and obtain his profit. The operating expenses include those of buying, dressing, manufacturing, refrigeration, transportation to distributing points, maintenance of wholesale houses, etc. Just what part of the gross margin is consumed by expenses and how much is left for profit, it is impossible to say, although it was shown above that Swift and Company has claimed that profit constitutes but three per cent of sales, which is less than one fifth of the gross margin.

The retailer, as was shown in Table IX, sells beef on a margin of 30.3 per cent of selling price, mutton at 26.5 per cent, and pork at 23.2 per cent. The demand for certain cuts of beef makes the margin on that commodity the highest. Pork is sold on the smallest margin because it is handled largely in the form of smoked meats and wholesale cuts, thus minimizing the loss from waste. Smoked meats are also not so perishable as fresh meats and hence the risk in handling is smaller and the margin narrower.

As shown previously, the expense of a shop doing an annual business of $20,000 averages about 24.7 per cent of the gross sales. This cost includes wages of the proprietor, and interest on the capital invested. As compared with this 24.7 per cent, the margins taken on the three principal kinds of meat are 30.3 per cent, 26.5 per cent, and 23.2 per cent respectively. The profits do not appear to be abnormally large. The expenses of butcher shops are large in proportion to sales for causes that may be

attributed largely to the customs and desires of the consuming public. In the first place the public usually prefers to buy its meat at stores not too far away from home. Consequently there are a large number of small butcher shops, each with a small volume of business. Small-scale business means relatively high expenses, just as large-scale business in the packing plant means relatively small expenses in comparison with sales.

More important, however, is the service demanded by consumers. This service calls for inspection of animals when killed; cleanliness and proper temperature from slaughter to consumption; ageing and ripening of meat which adds to the flavor but takes space in the "coolers;" the keeping on hand of numerous kinds and classes of meat by the butcher at all times; the presence of a sufficient number of clerks to give prompt service; and, most important of all, an adequate delivery system. Big shop or little shop, large order or small order, long trip or short trip, the customer must get what he wants when he wants it, which is usually "at once."

The following table presents a summary of marketing costs, showing the amount taken out by each factor in the marketing process, and the per cent that each of these amounts is of the total final value of the products of each kind of animal:

TABLE X

SUMMARY OF MARKETING COSTS AND DISTRIBUTION OF GROSS RETURNS FOR A 1,000-POUND BEEF, A 230-POUND HOG, AND AN 80-POUND SHEEP ON THE BASIS OF THE CONSUMER'S PRICE

	CATTLE		HOGS		SHEEP	
	Amount	Per cent	Amount	Per cent	Amount	Per cent
Farmer receives.....	$60.07	60.5	$18.01	60.2	$4.53	62.2
Freight, yardage, feed, etc.	2.43	2.4	.62	2.1	.27	3.7
Packer's gross returns.....	11.21	11.3	4.59	15.4	.87	12.0
Retailer's gross returns....	25.55	25.8*	6.67	22.3*	1.61	22.1*
Total value.....	$99.26	100.0	$29.89	100.0	$7.28	100.0

* It should be noted that these returns for retailers are expressed as per cents of the total receipts, i. e., on final retail price of carcass plus the amounts received by packers for by-products. They are not comparable with the retailers' cost of doing business, and should be used with care.

The most significant feature of this table is that in each case the farmer receives slightly over sixty per cent of the price for which his animal finally sells. It should be remembered that direct shipment by the farmer in carload lots is assumed in this case, that no allowance is made for shrinkage, and that if the animal were sold to a local cattle buyer or through a coöperative shipping association, the cost would be somewhat higher. Since a large proportion of Minnesota stock is sold through local

buyers, it would perhaps be more nearly accurate to say that the Minnesota farmer receives on the average about fifty-seven or fifty-eight per cent of the amounts finally paid for all products from his stock.

Equally interesting is the fact that of the total spread between farmer and consumer, the retailer takes well over half, and that in the case of cattle, he takes nearly twice as much as the packer and other marketing agencies together. It has already been shown, however, that the wide margin taken by the retailer is due not to his ability to obtain greater net profits, but to the high cost of retailing, due in turn to expensive service demanded by consumers. In view of the widespread notion, however, that on the average the farmer gets less than fifty per cent of the final value of all his products, it is rather noteworthy that in the case of live stock he obtains between fifty-five and sixty per cent.

COÖPERATIVE POTATO MARKETING IN MINNESOTA

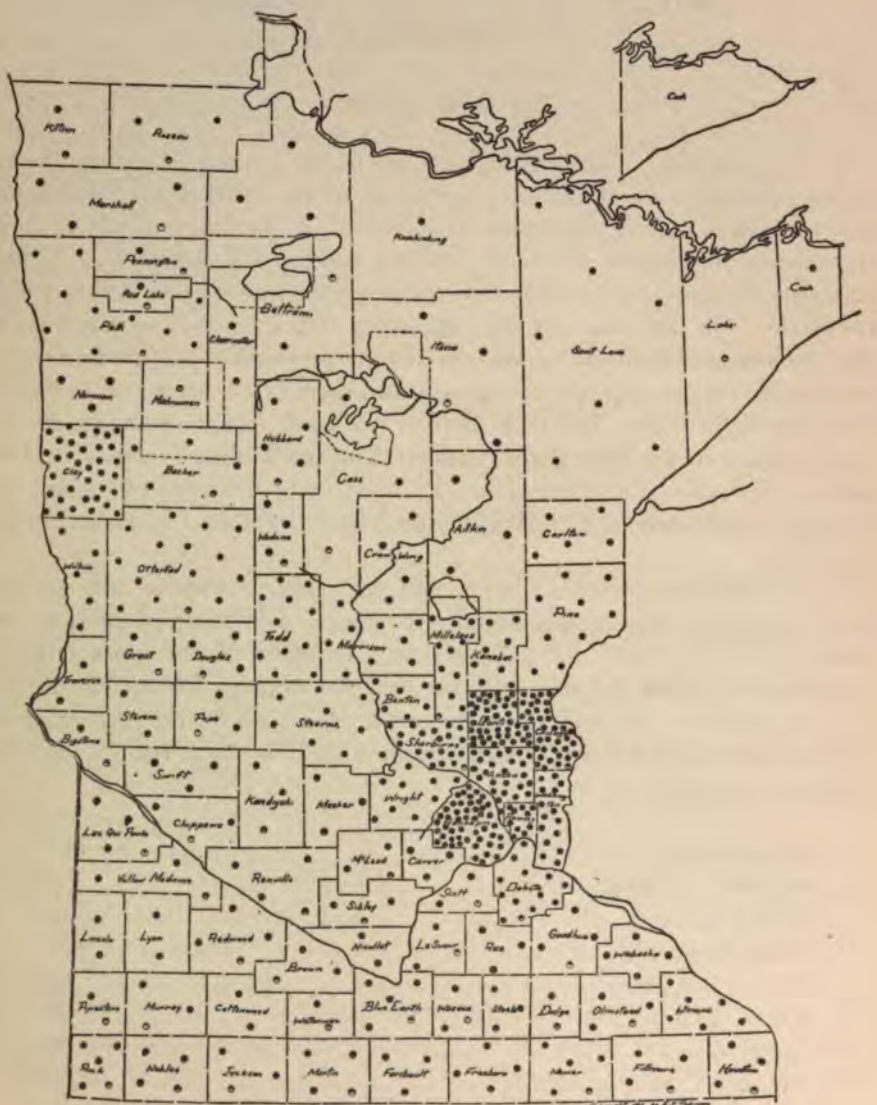
By O. B. Jesness

The principal potato-growing sections of the United States are located in the northern tier of states. According to the 1910 census, Minnesota ranked fifth in potato production, as indicated by the diagram which shows the relative importance of the ten leading states. The dot map of Minnesota's production in 1909 shows the principal regions of production within the State. On this map one dot represents 50,000 bushels of potatoes, so that the production of each county is directly proportional to the number of dots shown on the map. It is apparent that there is a leading potato district near the Twin Cities, and that there is a second region centering around Clay County in the Red River Valley. The ten leading counties in 1909 were as follows: (1) Hennepin, (2) Isanti, (3) Chisago, (4) Clay, (5) Anoka, (6) Sherburne, (7) Washington, (8) Otter Tail, (9) Dakota, (10) Mille Lacs.

In Hennepin, Isanti, Chisago, and surrounding counties the acreage is not increasing very rapidly because the land is well occupied and potatoes have been grown here for a long time. In some of the more outlying counties this is not the case and we find the acreage increasing rapidly. This is shown in the following statement which gives the percentage of increase in acreage for 1910 as compared with 1900 for a few of the most important counties:

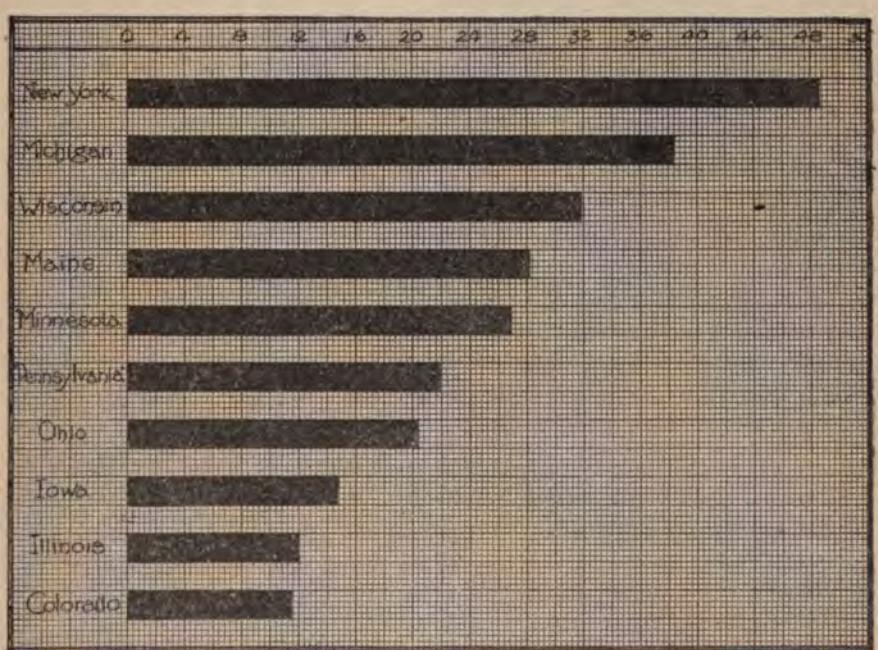
	Per cent
Clay County	455
Sherburne County	254
Polk County	136
Todd County	109
Hennepin County	83
Anoka County	58
Isanti County	26
Chisago County	17

This indicates that any considerable increase in potato acreage in Minnesota may be looked for in counties outside of the older potato-growing section.



Potato Production in Minnesota, 1909. (One dot represents 50,000 bushels)

Since the leading potato states of the United States are in the North, while the southern states do not produce enough for their own use, the northern states find the market for their surplus potatoes in the states lying to the south. The important potato-growing states of Maine, New York, and Michigan supply the Middle Atlantic States, Central States, and Southern States; Wisconsin ships largely to Chicago. Minnesota is shut off from the East by these states and sends its potatoes southward to Iowa, Missouri, and other states in the Mississippi Valley, as well as southwestward to Nebraska and Kansas. Large quantities of seed potatoes are also shipped to the southern states.



Potato Production of the Ten Leading States in Millions of Bushels, 1909

In any extensive marketing of potatoes there are always middlemen concerned in the transaction. The only place where we find no middlemen is where the producer deals directly with the consumer. This is the simplest form of marketing but obviously it can not be carried on very extensively in the case of potatoes. A farmer living near enough to a large city may sell his potatoes directly to consumers in the city, and this may also take place to some extent in towns throughout the State. As production exceeds local consumption, the farmer must find a broader market than that offered by local consumers. Municipal markets in the larger cities may

bring about some direct selling, but as a rule the farmer has neither the time nor inclination to wait for the consumer, and sells to a dealer. When the farmer sells to a dealer, a middleman is brought into the transaction. There is a good example of employing one middleman where the farmer sells his potatoes to a local merchant who in turn sells to consumers. In some instances the farmer may ship his potatoes to a merchant in some other locality or state, adding transportation costs.

The methods enumerated represent only the simplest way of marketing. In the more complex methods which are more extensive than the other form there may be two, three, four, or even more middlemen standing between the farmer and the consumer. If the farmer ships his potatoes to a wholesaler or sells them at the local wholesale dealer's warehouse and the wholesaler sells to a retailer, there are two middlemen. Or it may happen that the farmer ships them to a commission man who sells the potatoes to the retailer. If this commission man sells to a wholesaler who sells to the retailer, there are three middlemen. The same is true where the farmer sells to a local dealer or merchant who ships through a commission man to a retailer. In this case, if a wholesaler steps in between the commission man and the retailer, there are four middlemen. A commodity that must pass through several hands before it reaches the ultimate consumer must necessarily show a wide spread between producer's and consumer's price. Each middleman takes some part in the transaction, such as giving his time, the use of his money, the assumption of risk, and for doing this the dealer takes his return from the potatoes, each added dealer thus increasing the price. Too many middlemen of one class may cause duplication of work and needless expense, but on the whole these middlemen are necessary in the present organization of the business.

When Coöperation Is Needed

It is principally the purpose of a coöperative potato-marketing association either to furnish a local warehouse where none exists, or to cut down the expense of handling at local points and save to the farmers the profits that otherwise accrue to other local marketing agencies. A coöperative association does not necessarily diminish the number of middlemen. In fact, if the farmers have been in the custom of shipping their own crops individually without recourse to a local buyer, the formation of a shipping or warehouse association really has the effect of adding one more middleman, but increases the efficiency of marketing through collective shipping and through an improvement and standardization of product. More commonly such an association merely replaces other local marketing agencies. There is then the possibility of saving by a careful selection

of markets, and sometimes by a more direct shipment to dealers who sell direct to the retail trade, thus eliminating one or more middlemen. The ideal system of course is to have both the producer and consumer organized so that the one can deal directly with the other. At present we have no widespread movement of this character, and it is doubtful if this method will ever become very popular because of the many obstacles which stand in the way of its development.

In Minnesota the methods of marketing potatoes vary somewhat with the locality. In the immediate vicinity of the Twin Cities a considerable amount of potatoes is hauled to the cities and sold direct to retailers by the farmers themselves. In the leading potato-producing section, which is north of the Twin Cities, each shipping point usually has several warehouses owned by Twin City dealers or by local dealers. This section has been in the potato business for a long time and the marketing end is well established. In the other important potato region, including Clay County and vicinity, potato-growing on a commercial scale is newer, the district is farther away from the cities, and there are not so many local warehouses. In the rest of the State, as a rule, only enough potatoes are grown to supply local needs. The storekeepers are usually the ones who handle the potato business in these places, selling potatoes to local customers, and occasionally shipping out such small surpluses as may accumulate. The statement is often made that no coöperative enterprise can be a success unless it springs from some definite need for such an organization, and the question naturally arises, What need is there of coöperative marketing of potatoes in Minnesota under the existing conditions? There are two conditions which create a real demand for better marketing facilities and as the result of which there ought to be a realization of the need for such an improvement. These two conditions are, first, where there is no regular local market, and, second, where the local market is unsatisfactory. This of course refers only to the localities where enough potatoes are produced to make shipping worth while.

The first condition refers to potato-producing communities that have to depend on local merchants or others not regularly in the potato business to buy up their potatoes. A man not regularly in the business is not prepared to handle the potatoes properly, and is usually only willing to buy them at such times as he finds convenient. There may be enough potatoes grown in the locality to make shipping profitable, or conditions may be such that potato-growing would be profitable if there were a dependable way of disposing of the crops. Many farmers have noticed the high price paid in years of scarcity and have resolved to grow some for market; then perhaps the next year proved to be one of high yield over the country, and as a result the farmer finds that there is no market

for his surplus crop. The merchant who was willing to buy when there was a good demand for potatoes now does not wish to bother with them because it is difficult for him to find a market for the few potatoes he would handle. If the farmer were able to dispose of his large crop he would at least get something in return, the high yield helping to counteract the low price.

Under the second condition where there is a need for better marketing, there may be a local dealer or a city dealer owning a warehouse at the shipping point but who gives unsatisfactory service. If this dealer has no competition it is not to be expected that he is going to pay the highest market price for potatoes. Often the farmer does not know how much he ought to receive for his potatoes. The man who does the buying can hardly be held to blame for such conditions; everyone is in business for what there is in it, the potato dealer as well as the farmer. Take, for example, the farmer who desires to buy more land; he will not pay more for this land than he is compelled to in order to secure it, or when people trade at stores they always try to get as much for their money as possible. It is the same way with the dealer, if he can get potatoes for thirty-five cents, he is not going to pay forty cents. He is also apt to be much more careful to reject the potatoes of poorer quality when there is no competition. A dealer of this kind will try to do business in such a way that it will not become apparent that he is making too much on the transaction. He has to be careful not to stir up antagonism for fear he will invite competition either in the form of coöperative associations or from other dealers who may be induced to come in.

It is under circumstances such as these that the farmer is most likely to see the need of coöperative marketing and feel inclined to take up this kind of coöperation. If an enterprise of this nature is started in a place where the market is well handled by independent buyers, it is a much more difficult proposition to induce the farmers to take hold and to withstand competition. In places where there are several independent buyers who have been there for some time, much more severe competition is to be expected than where there are only one or two buyers, none of whom has been on the ground very long.

Coöperative Potato Marketing in the East

There are some organizations in the East formed for coöperative marketing of potatoes and other produce, which have clearly demonstrated that the farmers can get together and make such an enterprise a success. The Eastern Shore of Virginia Produce Exchange with general offices at Olney, Virginia; the Monmouth County Farmers' Exchange of Freehold, New

Jersey; the Long Island Potato Exchange; the Aroostook Potato Growers' Association of Presque Isle, Maine; these are a few of the associations which have shown marked success. Some of them handle principally potatoes, others handle other produce as well. All of them, however, are comparatively large associations, and with the exception of the Long Island Association, are not confined to single shipping points.

According to its annual report, the Eastern Shore of Virginia Produce Exchange handled over 8,000 carloads of Irish potatoes during 1913, and in addition to this, many carloads of sweet potatoes, onions, cabbage, strawberries, and peas. This organization was started in the year 1900 and has had a remarkable growth since that time. The secretary-treasurer states that the organization has always been conducted on strictly up-to-date principles, and he attributes its success largely to this factor. The association has its own registered trade-marked brands and keeps up a careful inspection system in order to maintain the standards set. Each one of the forty-three loading points has an inspector, bringing the annual cost of inspection up to about $25,000. The central office keeps in touch with the markets by means of telegraphic connection, the telegraph expense for a year amounting to from $15,000 to $20,000. About ninety-five per cent of the produce is sold f. o. b. loading point and it is nearly always sold promptly after loading. The general office takes care of the selling and instructs the local agent where to send the produce. On produce sold f. o. b. the association charges a commission of five per cent. In case the association employs commission men to sell for them these charge eight per cent, and return three per cent of this to the association. The large volume of business enables the association to do business on this small commission.

The annual report of the Monmouth Farmers' Exchange of Freehold, New Jersey, for 1912, shows a total business during the year of $941,765.51, with a net profit of $6,708.30 and a surplus of $1,736.04 after paying a five per cent dividend and allowing for a five per cent depreciation on property. The capital stock for 1912 was reported as $75,195. This association handled 412,202 barrels of potatoes during the year, besides a number of other vegetables, making a grand total of 2,891 carloads of produce. In 1908, when this association started, all it had was a capital of $7,000. Its business has developed so rapidly that the total value of produce marketed in the five years 1908 to 1912 inclusive amounted to $4,320,748. The average price paid the farmer for his potatoes was $1.68 per barrel or sixty-one cents per bushel. In 1912 this organization transacted business in every state east of the Mississippi River with but three exceptions.

The Long Island Potato Exchange has about eight hundred members and the Aroostook Potato Growers' Association has about seven hundred

members. These two associations handle potatoes principally and have shown marked success. In Maine we find the first steps taken in any state to organize on a state-wide basis. The Bureau of Marketing and Supplies of the Maine Agricultural Department has this organization movement in charge. First, eight local exchanges were organized, and then a meeting of representatives from these associations was held. As a result the Farmers' Union of Maine was organized as a state central body to act as a guiding and directing influence for the local associations. The present plan is to get a number of states to do the same and then combine the state organizations in the same manner.

Coöperation in Minnesota

With regard to the coöperative marketing of potatoes in Minnesota it is to be remembered that it may not be possible for any Minnesota association to duplicate these large eastern organizations, because the latter are located in rich truck districts and close to large markets; and yet the success of these associations indicates that there are great possibilities in coöperative marketing of farm produce.

Most coöperative marketing associations are of recent origin and it is difficult to predict how widespread and far-reaching this movement will be. Farmers have formed coöperative creamery associations, elevator companies, live-stock shipping associations and engaged in other forms of coöperative enterprise with considerable success, and it is not strange that they should also undertake coöperative potato-marketing even though it offers certain difficulties that are not found in other forms of coöperative endeavor. Creameries operate the year round and the output is fairly uniform; potato warehouses are run for only part of the year; the crop varies in amount; and in cold weather potatoes are somewhat difficult to handle and ship. Live-stock shipping requires no outlay for warehouse or other equipment; it is carried on the year round, and the returns from shipments come in more promptly and with less uncertainty than in the case of potatoes.

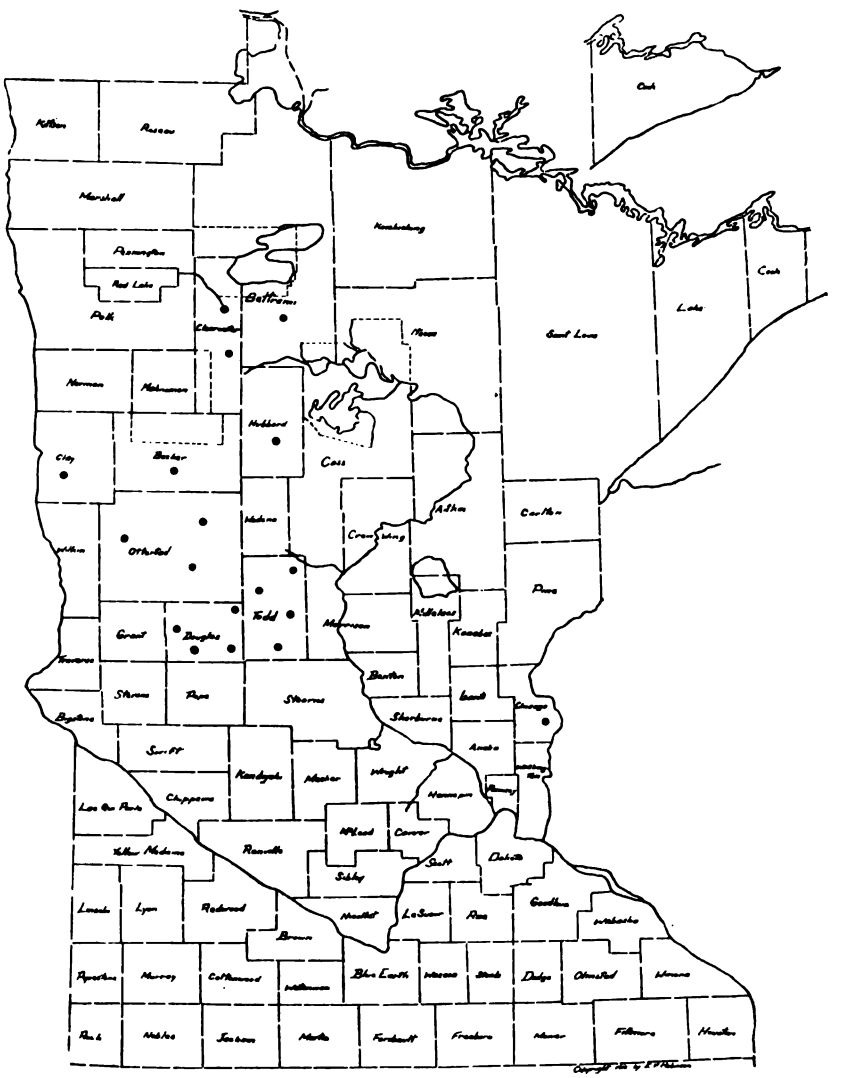
A person not closely in touch with this work would naturally suppose that potato-marketing associations would be most numerous in the leading potato sections. This is not the case in Minnesota, however, and the reason for this is that the leading section is well taken care of as far as marketing is concerned by the "line houses" owned by city dealers. This region is near the Twin Cities and there is sufficient competition to keep the market in good condition. Some coöperative warehouses were started in this section in years gone by, but they met with little success, and although there are still some warehouses owned by farmers, they are generally leased to

and operated by independent dealers. The outlying districts are not so well looked after, and as a result it is here that coöperative associations are springing up. They are found in Douglas, Otter Tail, Todd, Clay, and some of the neighboring counties, and also farther to the north in Beltrami and Clearwater counties. It is in these counties that the farmers have become dissatisfied with their potato markets and have taken steps to overcome this by forming coöperative marketing associations. In some of these places there was no regular market for potatoes; in others the market was unsatisfactory.

The Division of Agricultural Economics of the University of Minnesota is empowered by an act of the state legislature to collect information concerning coöperative enterprises in the State. In order to get data concerning coöperative potato associations, blanks were sent out through this division to all the associations in the State that could be located. No reply was received from some of these places; a few had organized but had not commenced business. Up to the time of writing (June, 1914), sixteen associations have been definitely located. This includes only the ones that have been heard from and that are known to be engaged in the potato business. Associations undoubtedly exist at other places, but no information has been elicited from them by correspondence.

Locating the sixteen associations by counties, there are four in Todd, four in Douglas, three in Otter Tail, two in Clearwater, one in Beltrami, one in Hubbard, and one in Clay. None of these is in the older potato section, such as Chisago, Isanti, or neighboring counties. Reference to the accompanying map shows two fairly well-defined groups, the one centering around Todd, Douglas, and Otter Tail counties, the other farther to the north in Clearwater and Beltrami counties.

The blanks sent out requested that they give a statement of the amount and value of potatoes bought and sold, also of vegetables, and miscellaneous receipts for the last fiscal year. A statement of the expenses for the year and a balance sheet were asked for, and if possible a monthly summary of potatoes bought and sold. In addition there were a number of general questions such as the date of organization, number of members, stock and patronage dividends, the method of buying and handling potatoes, the method of financing operations, capacity of the warehouse, amount of equipment, amount of help, method of selling, to whom sold, freight charges, price paid, varieties handled, and a request for suggestions to localities contemplating the organization of similar associations. These blanks were filled out with various degrees of completeness. In some cases practically all the information was given; in other cases only some of the more general questions were answered. In addition to the information received



Distribution of Coöperative Potato Warehouses by Counties, Minnesota, January 1, 1914. (No reports were received from the associations shown on the map in Becker and Chisago counties)

through these blanks, several associations were visited and considerable information was secured in this way.

Summarizing information secured by means of the blanks: Fourteen associations reported on the number of members, showing a total of 1,282 members, or an average of 92 to an association; twelve associations reported a total paid-up capital of $21,690, or an average of $1,807. The par value of shares for fourteen associations runs as follows: eight have ten dollar shares; two, twenty dollar; two, twenty-five dollar; one, fifty dollar; and one has one hundred dollar shares. Of the sixteen associations, four were started in 1911, five in 1912, and the other seven in 1913, showing of what recent origin these associations really are. In regard to salaries paid managers it is difficult to strike an average, as most of the associations reported the total for the year, failing to state the number of months employed. The average probably lies somewhere between sixty and seventy-five dollars per month. Only seven associations gave a full report of their expenses for the year, ranging from $61.00 to $2,467.90, the average for the seven being $1,009.29. The association reporting only $61 expenses owns a warehouse where the members store their potatoes preparatory to shipment. There is no money paid out for manager's salary or other help as the farmers do all the work themselves. Omitting this association, the average expense for the other six associations is $1,167.34. Fifteen reported on the kind of produce handled; ten handled potatoes alone; one reported mostly onions; one reported potatoes and onions; and three reported potatoes, live stock, eggs, poultry, hides, etc. The amount of potatoes sold ranged from 550 bushels[1] to 27,610 bushels for the ten associations reporting on this point. The average for the ten is 14,126 bushels. Eleven associations reported the value of potatoes sold, ranging from $264[1] to $10,832.61, a total of $65,587 and an average of $5,962.45.

The value of warehouse and equipment for nine associations ranged from $1,200 to $7,000, averaging $4,074.36. The average paid-up capital for these nine associations was $1,913, or only forty-seven per cent of the average cost of warehouse and equipment. Thirteen associations replied that the potatoes were sorted. Eight associations reported that the farmer takes back the "culls," four stated that the "seconds" or "culls" were sold by the association for feed or other purposes. Ten associations reported the method of selling as follows: one reported selling outright, two reported selling on consignment, the rest follow both methods. Nine associations name the following places to which potatoes are shipped; seven mentioned Kansas City; three, Minneapolis; two, Chicago; two, Grand Forks; one St. Louis; one, Lincoln, Nebraska; one, Tarkio, Missouri; and one, Minot, North Dakota. The freight charges vary from eleven cents to thirty cents

[1] Represents business of an association recently organized.

per hundred pounds or from six to eighteen cents per bushel. Nine associations reported on the proportion of the local output handled, as follows: one stated twenty-five per cent; four, fifty per cent; one, sixty-six per cent; one, seventy-five per cent; and two, one hundred per cent, or an average of sixty-five per cent. Ten associations reported on the leading varieties, each association naming several as follows: Early Ohios mentioned by seven, Burbanks by six, Rurals by four, Carmens by three, Rose by one, and Russets by one. In regard to the effect of the association on the local price, eight associations replied; three stated that the price ranged from three to ten cents higher, while the other five stated that the price was about the same as in neighboring towns where there are no associations.

This sums up the information obtained from the blanks sent out. Due to a number of causes, it was impossible to get such perfect results from the questionnaire as were desired. The records kept by some of the associations were not complete enough to answer all questions; some of the associations were too new to be able to give full reports; and in some cases many of the questions were overlooked or were intentionally left unanswered. After most of the reports were in, several of the associations were paid a personal visit. Each association had started under somewhat different circumstances and had had various experiences. The object of this visit was not so much to obtain an exact financial statement of their business, but rather to get at some of the experiences the associations have had, the circumstances leading up to their organization, the mistakes they have made, their plans and prospects for the future, and similar matters.

Some of the associations were started through efforts of the business men of the town; some were started through an organization already existing, as for instance the Society of Equity; still others were started by the farmers getting together without any outside help. As is to be expected, the farmers take the greatest interest in the associations which have been started by themselves, and from observations made in this study, this seems to be the most desirable way. If the farmers see the need of such an organization themselves, an association can be formed which will have a much better chance of success than if started for them by business men of the town.

Naturally, a number of mistakes have been made by these organizations which are pioneers in the field. One mistake that appears to have been especially common is that warehouses have been built before a sufficient number of shares of stock have been sold and paid for, and as a result several associations have found themselves deeply in debt when commencing business. The explanation is that such organizations are often started too late in the season and in order to be ready to handle the year's

crop the contract for the building of the warehouse is let before enough stock has been sold. It is not to be understood that the association must wait until enough shares have been sold to pay for the entire warehouse, but there ought to be enough to pay for a large proportion of the cost. It is easier to sell stock before the warehouse is built than to wait till afterwards. Before the warehouse is started the farmer may feel that it is incumbent on him to give financial assistance in order to get it started; after it is built the need of his help will be less apparent and he thinks that he will see how it is going to work out before he invests his money. Furthermore, he dislikes to put his money into an organization that is so deeply in debt. The greater the number of farmers financially interested the more farmers there will be who will patronize and support the organization. An association should have enough shares of stock sold to cover at least fifty per cent of the cost of the warehouse, before commencing to build. Some of the associations have the par value of shares so low that it is difficult to raise the money on that account; others have the same difficulty because the share value is too high. It is desirable to have the par value low enough to exclude no one and then to urge upon those able to do so to buy several shares of stock.

Another mistake that is often made is in hiring the manager. It is in some cases difficult to find an available man in the community who has the necessary qualifications, but it is often true that the board of directors of such an organization tends to look more to the cost of the man in terms of salary than to his value to the association. The man who is willing to work for the smallest salary is not necessarily the man to employ. A higher-priced man with better qualifications will very likely make a good deal more for the association than the difference in salary and will prove cheaper in the end. A man in order to be an efficient manager must first of all be honest, he must have the quality of leadership, he must enjoy the confidence of members, and he must be able to get along with everyone. He should be a man who is acquainted in the community, one who knows the local conditions, and who is acquainted with the potato business. Several association have suffered from want of these qualities in their managers.

Another common mistake is to be too anxious to show a profit. This would be a commendable trait were it not for the fact that it is usually accompanied by a desire to declare dividends. If there is a fair profit at the end of a good season the members are too ready to distribute it as dividends on paid-up stock instead of appropriating a liberal amount to a reserve fund or using it to pay off debts or to make improvements. The next year may be a poor year and as a result the association may be behind. In a business as variable as the potato business, the association must

be prepared for reverses part of the time, and in order to be prepared should have a reserve fund large enough to take care of any deficit or unusual expense. If the association is not able to meet its debts after having shown a good profit the previous year, the patrons are very apt to lose confidence in the association and its management.

There are other problems which the associations must face. Sometimes the quantity of potatoes handled is not large enough to make the business as profitable as it should be. The acreage, however, seems to be on the increase, so that this factor will soon be overcome. If the associations make a success of marketing, this will have a tendency to encourage the farmers to grow more potatoes. At least one association has had considerable trouble because of freezing in the warehouse. In this case the trouble can be remedied without a very great expense, but it serves as a warning that care must be taken to build frost-proof warehouses. Some associations have suffered no loss from deterioration of potatoes in transit; others have suffered considerably in this respect. In one case some shipments to Kansas City were delayed three or four weeks in transit, resulting in a heavy loss. In such a case the railroad company of course is held responsible, but it takes some time to get a matter of this kind adjusted and the delay causes dissatisfaction among shippers who do not understand why such things occur. In some cases returns show "dockages" for dirt or unusable potatoes. Some cases have been found where the dockages were unwarranted. A single known instance of this sort tends to create suspicion in the mind of the shipper.

Another problem arises from the failure to sort the potatoes. Some managers have a hard time getting the farmers to see the need of sorting. Many farmers think that everything should go, large or small, failing to realize that this adversely affects the price received and often means paying freight on goods for which no money is received. One manager has started the practice of putting a shipper's number on each sack, hoping thus to be able to trace "dockages" back to the original grower of the potatoes. One of the primary objects of a potato-shipping association should be to grade carefully and thus standardize the product so as to command the highest price possible and to build up a reputation for the association.

Each association must decide just what it will handle. In some cases the associations are strictly potato associations, while in other cases live stock, eggs, poultry, and other farm produce are shipped. Some of the associations have bought carloads of salt, feed, and twine, and have thus acted not only as selling organizations but also as agencies for buying goods in carload lots. Some of the associations now dealing only in potatoes are contemplating a change so as to include other products. They feel that better and more constant use would be made of the warehouse and that the

manager would be given steady employment the year round. Local conditions must determine just what is to be handled. In case coöperative work is new in the community, the association usually feels it is best to go slowly at first and not to take on new things until it is on a sure footing. When there are other forms of coöperative enterprise existing, the different organizations may come together to employ the same manager or in other ways unite to make this work more efficient.

Another question that confronts a new association is the method of buying. Some associations prefer to pay the farmers cash for their potatoes when they are delivered at the warehouse, while others do not pay the farmers until the returns from the shipment are received. There are things to be said on both sides and this is another case where local conditions play an important part. If the farmers are prosperous and willing to wait for the returns, it may cause no dissatisfaction if they are not paid cash. In some places the farmers like to get the money upon delivery of the potatoes and are dissatisfied if they do not get it. Where there is active competition from an independent buyer, the association often finds it has to pay cash in order to get its share of the business. Paying cash necessitates borrowing money because an association does not usually have sufficient working capital to finance such operations. The associations usually borrow their money at a local bank. When the farmer has to wait for returns, there is likely to be dissatisfaction with the final price returns, and sometimes an irritating delay in adjusting claims, mistakes, etc. Unless there is a good system of prorating the returns from shipments, injustice and dissatisfaction are the usual result. This is illustrated by the following instance: one association sent out two carloads on the same day, both consigned to the same selling agent. It happened that this agent already had an order for one car which he filled with one of the two cars at the current market price on the day of arrival; the other car he was forced to hold for a few days. Meanwhile the price went up so that this second car brought five cents more per bushel than the first. Naturally the man who had his potatoes in the first car was dissatisfied, even though he obtained full market price. No amount of arguing could convince him that someone was not getting the best of him. If these two shipments had been averaged, the man in the first car getting the same as the man in the second, both men would have been satisfied. The returns from shipments ought to be prorated at least for short periods—every week or every two weeks. Although perhaps it is the safer policy in the long run to await returns before paying patrons, the paying of cash at the time of delivery is likely to appeal to the farmer as being the most business-like and the better system of the two.

The future of such a new movement as the organization of coöpera-

tive potato associations is hard to predict. Nearly all of the managers of the existing associations seem well satisfied with the work that has been done so far and look forward to a prosperous future for their organizations. They realize that this movement is a new one and that the associations are still hampered by a lack of funds, and that they, as well as the growers, have things to learn in regard to the business of marketing. If the associations now organized continue to be successful after a few years, and show that they are able to stand the test, a number of other places in the State will be encouraged to follow their example. The present indications are that there will be a number of associations formed in the next few years. Farming methods in Minnesota are gradually changing from a grain-raising to a more diversified system, and if potato-raising can be shown to be profitable, more farmers will take up the growing of this crop. This will in turn lead to demands for better marketing facilities and to the organization of more shipping associations.

The future bears promise of bringing forth another and a larger movement along the line of coöperative potato-marketing, similar to the eastern associations described above. This is an organization on a state-wide basis, the different local associations combining to form a central or state association. The managers of several associations said that their organizations could handle the local situation but that it is difficult to find the best market and to handle the selling end efficiently. This does not mean that there is not a demand for the potatoes, but that an association with its limited output necessarily can not command such attention from the buyers or reach the markets as well as if they were organized with a central body having this part of the business in charge. Such a general association would be a federation of associations, with a manager in charge and an office force located in some convenient place. The general office could keep in telegraphic connection with the markets and possibly maintain salesmen during the shipping season, and it could direct the shipments of the local associations. A federation like this would have an output that would attract buyers where the small output of each association separately commands no attention. It could afford to pay for the services of a man experienced in potato-marketing, and it could also carry on inspection work and possibly have its own trade-marked brands. General educational work among potato-growers could also be undertaken.

How to Organize an Association

For communities planning on forming a local coöperative marketing association there are certain steps to be followed.[2] First, find out if the

[2] Advice and assistance and model by-laws may be obtained from the Division of Agricultural Economics, University Farm, St. Paul, Minn.

quantity of potatoes available for shipping is large enough to make organizing worth while, also taking into consideration the prospects for an increase in acreage in the future. Care should be taken to find out whether the farmers are satisfied with the existing method of handling their potatoes or if better marketing facilities are demanded. This should be taken up long enough before the marketing season to give ample time for organizing the association, selling the stock, and building the warehouse, but not so far ahead as to make things drag too much. In order to get as many as possible interested, it is well to discuss the proposition at several farmers' meetings before actually organizing. Where there are farmers' clubs these are an excellent medium for the discussion of such an undertaking. Later a general meeting should be called at which the question of organizing should be considered. If it is decided to organize, articles of incorporation and a set of by-laws must be adopted, shares of stock must be sold, and the warehouse planned. An organization agreement should be used and the farmers signing this will state the number of shares they are willing to subscribe for.

The drawing-up of the articles of incorporation and by-laws is of great importance. As local conditions enter into the consideration of various points, each point should be gone over carefully and discussed at a meeting. There are certain points of importance that will be touched on here. First, there ought to be a "one vote for each member" clause. That is, each member should have the same power in meetings. This is to keep the power from centering in one or a few of the large stockholders, and also to help keep up the interest of all the members.

Provision should be made for an adequate reserve fund. This fund will be very helpful in meeting unexpected expenses that may be incurred, thereby giving the association greater financial stability. It will obviate the necessity of levying assessments on shareholders in order to meet such expenses and deficits. Levying assessments is the surest way of killing off the interest of farmers in a coöperative association or, it may be added, of anybody in any kind of an enterprise.

The manner of dividing the profits should be provided for in the by-laws. The profits may be paid out in the form of stock dividends, patronage dividends, (i. e., according to the amount of business contributed by each patron), or a combination of the two. Where all the surplus is paid out as dividends on the shares of stock, the man who owns most of the stock gets the most profit even though it may happen that he transacted no business through the association. This method of distributing profits makes it only a stock company and not a coöperative organization. On the other hand, if all surplus is paid out as a patronage dividend the biggest profit may go to a man who has furnished very little of the necessary capital, and one who has furnished a good deal of capital may get

little or nothing simply because he does not do any business with the association. The combination of these two, whereby a dividend of say six or seven per cent is paid on the money invested and the remainder is divided according to patronage, is the best method. The patronage dividend may be given to members only, or it may be divided between members and non-members. The latter is the better plan, and it is a common practice to allow non-members to share at half the rate received by members. This brings more patronage and serves as an inducement to non-members to become members. It is also a good plan to pay non-members their patronage dividends not in cash, but as a credit to apply to the purchase of a share of stock, which when fully paid for, entitles the non-member to full membership. This method will increase the number of members as well as the capital of the association.

It might be well to insert a clause in the by-laws to prohibit the paying of any dividends whatsoever during the first year of operation. This would give the association a better financial start. The by-laws should also have a clause preventing the association from starting business until a fair percentage of its capital is paid in. This amount should be large enough to give the association a good financial start and prevent it from being handicapped by too large a debt.

The par value of the shares of stock should be placed at a figure which will give sufficient capital and at the same time a large membership. If too high, it may reduce both; if too low, it may increase membership but decrease capital. Twenty-five dollars is near the average and seems to give the best results. In selling stock, the country should be well canvassed and as many shares as possible sold; this means both more capital, more members, and more interest in the enterprise.

A new association should be particularly careful that in its selection of a manager it gets a man who is competent, whose honesty is beyond a doubt, and one who will do his best. A cheap man may be an expensive man in the end. In addition the association should conduct its business on strictly up-to-date principles and in a way that will insure permanency.

A potato-shipping association of this character ought to accomplish more than just the marketing of the product. It has a splendid opportunity for improving the methods of growing. Where necessary, seed potatoes and spraying materials can be secured, and coöperative work in the growing part can be undertaken. The association can secure speakers to talk to the farmers on potato culture, demonstrations can be arranged, and coöperative work between the farmers and the Experiment Stations or Department of Agriculture can be encouraged. The farmers getting together in the business of the association can exchange ideas concerning their farming methods and derive benefit in a social way by coming in contact with their neighbors.

THE MARKETING OF MINNESOTA POULTRY

By S. H. Thompson

Production and Prices

The number of poultry on farms in the United States, including chickens, turkeys, ducks, and geese, increased from 250,623,354 in 1900 to 291,372,346 in 1910, or 16.2 per cent. During the same period the total value of poultry produced increased 48 per cent. The following table indicates that the increase in number of fowls was due entirely to the increase in number of chickens and that there was a marked decrease in the number of other kinds of fowls.

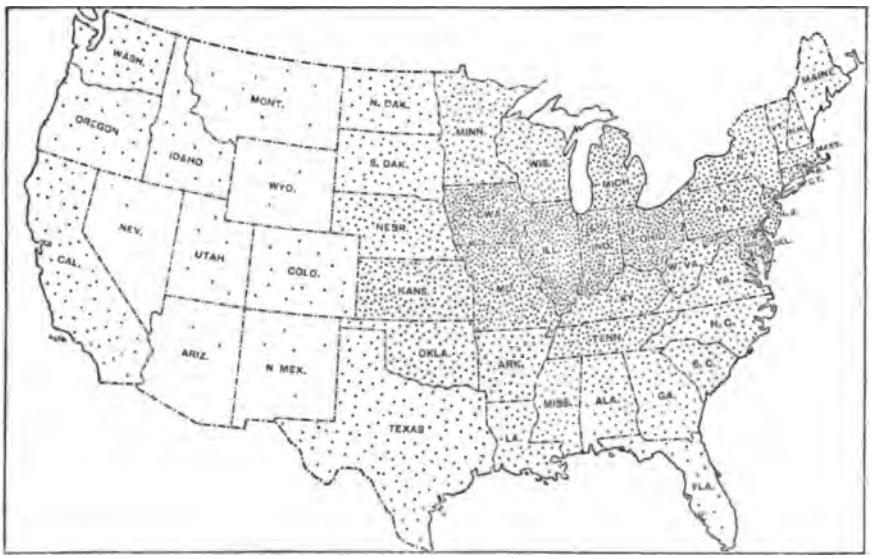
TABLE I

Poultry on Farms in the United States

Fowls	Per cent of all farms reporting 1910	Average value per fowl 1910	Number		Per cent of increase
			1910	1900	
Chickens.....	87.7	$0.50	280,345,133	233,566,021	20.0
Turkeys.....	13.7	1.79	3,688,708	6,594,695	44.1*
Ducks.....	7.9	.54	2,906,525	4,785,850	39.3*
Geese.....	10.4	.72	4,431,980	5,676,788	21.9*
Total....	.....	.....	291,372,346	250,623,354	16.2

* Decrease.

In Minnesota poultry-raising has been increasing much more rapidly than in the United States at large. The number of chickens increased about one-third between the last two census years, whereas for the whole country the increase was but twenty per cent. The following table indicates that the number of geese also raised in Minnesota increased, but that the number of turkeys and ducks decreased. Chickens constitute nearly ninety-seven per cent of all poultry raised in Minnesota. The value of poultry produced in the State increased from $2,927,717 in 1899 to $4,714,919 in 1909, or sixty-one per cent. Minnesota ranked sixteenth among the several states in value of poultry raised in both 1899 and 1909.



Number of Fowls on Farms in the United States by States, 1910. (Each dot represents 100,000 fowls)

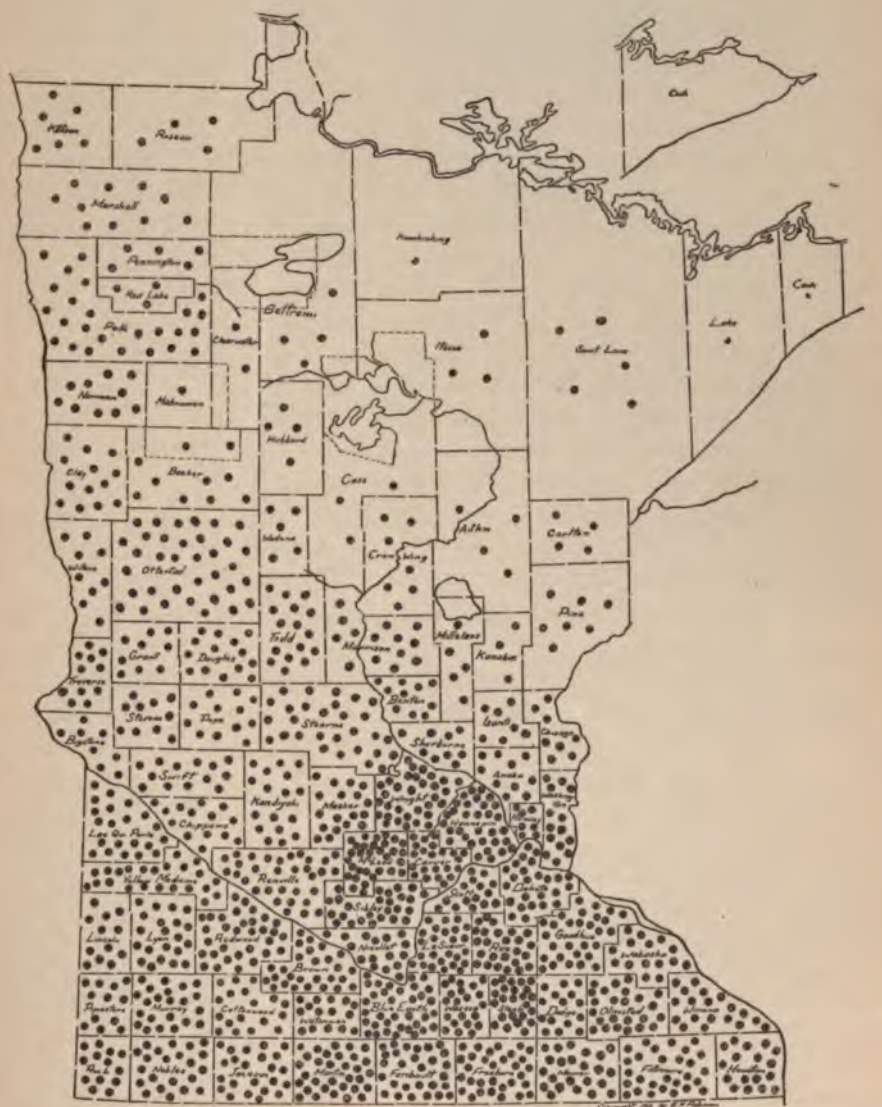
The greater increases in value than in number as noted above are of course due to the rapid advance in prices since 1900. The average farm value of all fowls in the United States increased from thirty-four cents in 1900 to fifty-two cents in 1910. According to the reports of the United States Labor Bureau, based on one hundred as the average price from 1890 to 1899, the relative retail price of hens was 99.6 in 1900, 123.6 in 1905, 145.7 in 1909, and 171.8 in 1913, or an increase of 72.5 per cent from 1900 to 1913. According to a report from the same source, the

TABLE II

POULTRY ON FARMS IN MINNESOTA

Fowls	Per cent of all farms reporting 1910	Average value per fowl 1910	Number		Per cent of increase
			1910	1900	
Chickens.....	91.3	$0.41	10,293,843	7,730,940	33.1
Turkeys.....	20.3	1.52	147,335	193,143	23.7*
Ducks.....	15.2	.59	94,269	127,635	26.1*
Geese.....	17.8	1.17	105,155	90,975	15.5
Total....	.....	.....	10,640,602	8,142,693	30.6

* Decrease.



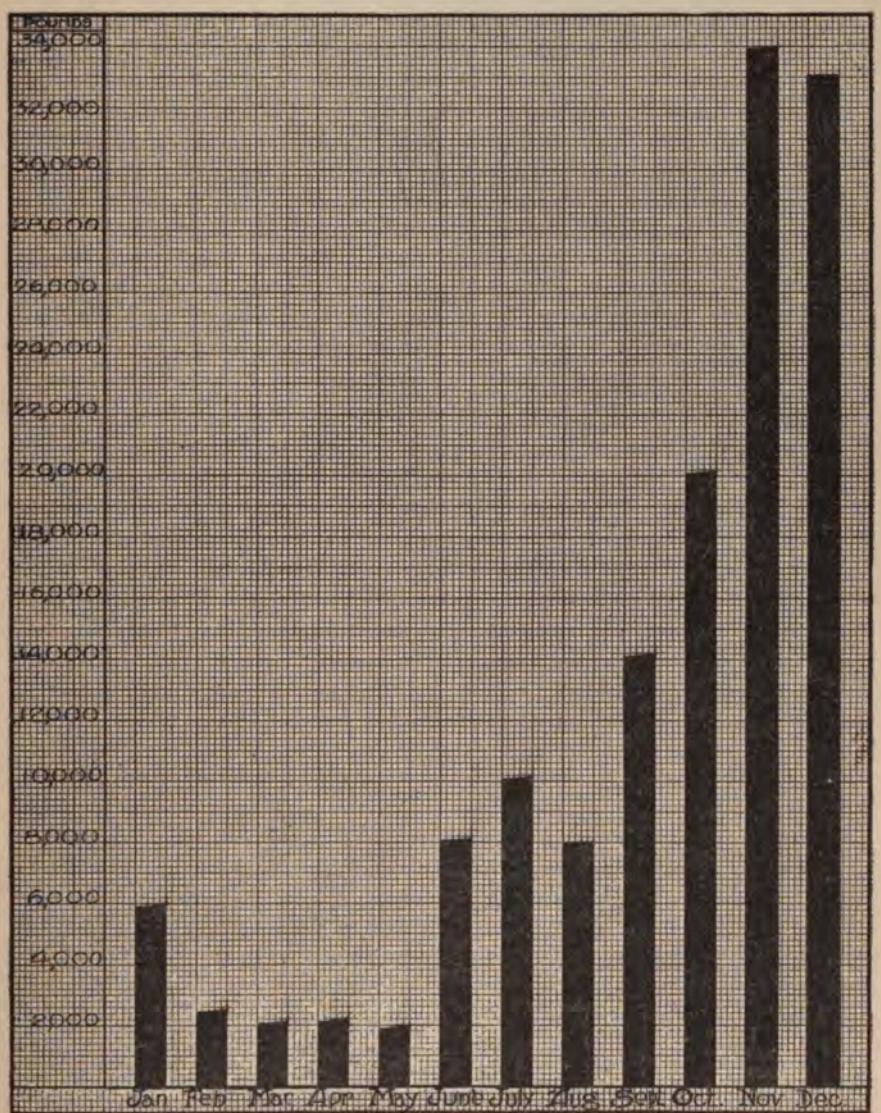
Number of Poultry Raised in Minnesota by Counties, 1909. (Each dot represents 8,000 fowls)

wholesale price on western dry-picked fowls was $0.1619 per pound in 1909 and $0.1824 per pound in 1913, or an increase of 12.6 per cent in five years. For the same period the relative retail price increased from 145.7 to 171.8, or 17.9 per cent. The higher retail price for poultry has just about kept pace with the rise in prices of other meats.

Ninety-one and three-tenths per cent of the farmers in Minnesota reported chickens according to figures of the Thirteenth Census. But, in Minnesota at least, poultry is a side-line on practically all farms, and to a large extent occupies the position of a by-product. While many farmers keep cost accounts on dairy and other live-stock enterprises, few pay much attention to the profits of the hundred hens kept on the average farm. A flock no larger than the proportions mentioned can pick up a large part of its living by roaming in the fields where both grain and insects may be found. A still more important consideration is the labor phase. Almost invariably the work involved in caring for the poultry is undertaken by the women and children. For these two reasons—the fact that the cost of feed is slight and the fact that poultry is cared for by unpaid labor—the cost of poultry production is very low.

Like many agricultural products, the output of market poultry is seasonal. The sales during the summer months are very small, and farmers sell the bulk of their poultry during the fall and early winter months, at which time the young fowls hatched during the previous spring are ready for market. The following statement shows the extreme variations of shipments by express of live and dressed poultry from a small town in northwestern Minnesota by months for 1912:

Month	Live Lbs.	Dressed Lbs.	Total Lbs.
January	300	50	350
February	.....	.....	.....
March	30	.....	30
April	.....	.....	.....
May	120	.....	120
June	.....	.....	.....
July	.....	.....	.....
August	.....	.....	.....
September	1,250	210	1,460
October	2,850	22	2,872
November	13,047	9,817	22,864
December	1,500	5,169	6,669
Totals	19,097	15,268	34,365

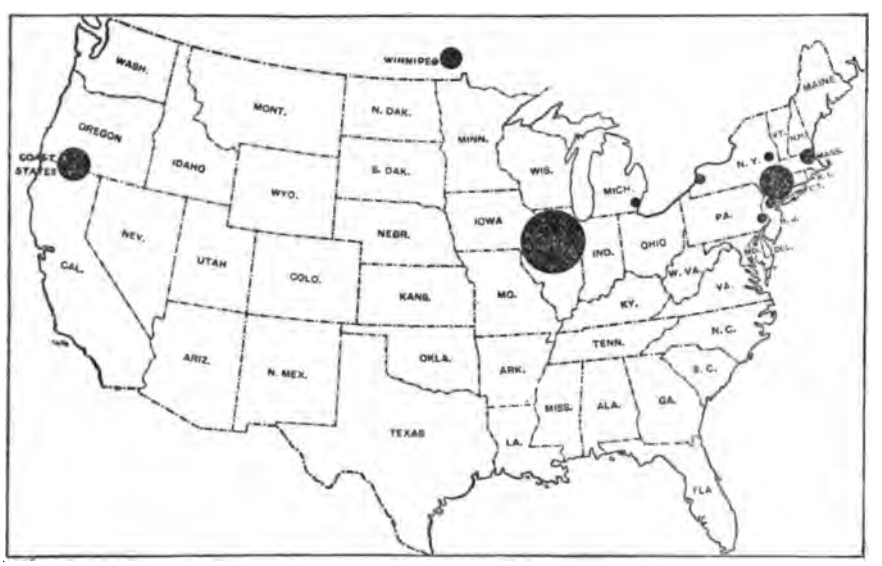


Shipments of Live and Dressed Poultry from a Country Shipping Point in Minnesota by Months, 1913

The same variation is indicated by the following figures and accompanying diagram for shipments of live and dressed poultry by express from a town in an important poultry-raising section about fifty miles west of Minneapolis during 1913:

Month	Live Lbs.	Dressed Lbs.	Total Lbs.
January	3,074	2,922	5,996
February	1,300	928	2,228
March	1,645	375	2,020
April	2,083	.....	2,083
May	1,867	.....	1,867
June	8,023	.....	8,023
July	10,722	.....	10,722
August	7,522	425	7,947
September	13,405	625	14,030
October	20,036	.....	20,036
November	26,138	9,805	35,943
December	27,760	7,410	35,170
Totals	123,575	22,490	146,065

These shipments from the country are concentrated largely in the Twin Cities, and although much is put into storage for local consumption, a large part is shipped to points outside the State.



Showing Relative Importance of Principal Markets for Poultry Shipped out of Minnesota, 1913. (Figures by car lots are given in Table III)

The following table shows by months the principal primary markets to which poultry was shipped in car lots outside of Minnesota in 1913. The 331 carloads shown in the table account for at least 75 per cent of all Minnesota poultry marketed outside of the State, and had an aggregate wholesale value of approximately $1,000,000.

TABLE III

CAR-LOT SHIPMENTS OF LIVE AND DRESSED MINNESOTA POULTRY BY DESTINATIONS AND BY MONTHS, 1913

Destination	January	February	March	April	May	June	July	August	September	October	November	December	Totals	Per cent of grand total
Chicago	30	19	16	4	....	....	1	5	14	23	23	39	174	52.6
New York City	1	3	....	....	....	....	1	2	5	8	9	15	44	13.3
Winnipeg	2	2	3	....	2	2	1	1	....	4	1	....	18	5.4
Detroit	1	....	1	2	....	....	....	....	....	....	....	2	6	1.8
Newark, N. J.	....	....	....	....	....	....	....	....	....	....	1	5	6	1.8
Philadelphia	1	....	....	....	....	....	....	....	....	....	1	3	5	1.5
Albany	3	....	....	....	....	....	....	....	....	....	1	1	5	1.5
Buffalo	....	....	2	....	....	....	....	....	....	....	....	2	4	1.2
New England	1	....	....	....	....	....	....	....	....	2	2	6	11	3.3
Pacific Coast States	3	5	1	1	....	....	4	.. .	...	14	6	4	38	11.5
Miscellaneous & unknown	5	1	1	....	....	..		....	....	2	1	10	20	6.1
Totals	47	30	24	7	2	2	7	8	19	53	45	87	331	100.0
Per cent of grand total	14.2	9.0	7.3	2.1	.6	.6	2.1	2.4	5.8	16.0	13.6	26.3	100	.....

With regard to the principal markets for Minnesota poultry it will be observed from this table that a little over half is sent to Chicago. This does not mean that Chicago consumes this proportion of Minnesota's shipments, because that city is an important distributing point for eastern interior markets. Just how much is retained for final consumption in Chicago is impossible to determine. Winnipeg and the Pacific Coast States together take about one-sixth of the total shipments. A few of the westward shipments go to San Francisco, but the majority go to the far Northwest. New York City is the second largest single market. Most of the New England shipments go to Boston. The monthly distribution of shipments to points outside the State does not show quite so large a concentration in October, November, and December as do the shipments from country points within the State, because some is held in storage in the Twin Cities and Duluth before shipment to outside markets.

Marketing at Country Points

Most of the market poultry is produced at points rather remote from the places at which it is consumed. Only a small amount of poultry is sent direct to the consumer. The channels by which it leaves the hands of the producer are four in number: first, direct shipment to dealers in large cities; second, country stores; third, local butchers for local consumption; and, fourth, "cash buyers."

The poultry marketed by direct shipment to city dealers is sent by express either to wholesalers who buy outright or on commission, or to retailers who buy outright. By far the larger amount goes first to wholesalers or commission men. The express rates are the same on both live and dressed birds. Whether these are shipped alive or dressed depends on the time of the year and the kind of fowl. During the summer no dressed fowls are sold. During the winter months such turkeys, ducks, and geese as are sold, usually are dressed, and some of the chickens sold at that period are also dressed. Live poultry is shipped in coops. The average weight of a coop is about forty-five pounds. About ninety pounds of live birds may be transported in such a container. These coops are loaned by Twin City or Duluth dealers, express prepaid at ten cents each to Minnesota points, and this amount is deducted from the proceeds of the sales.

At present not nearly so much poultry is marketed through the country store as formerly. When it is still so marketed the country merchants pay for market poultry in cash or trade, often at the option of the farmer. The cash price is usually about one cent less than the trade price, and little attention is paid to grading by the country storekeepers. They in turn sell to wholesalers in large cities or to cash buyers in their own towns. Those merchants who ship to large cities send most of their poultry to Minneapolis and St. Paul. Chicago also receives a considerable amount direct from Minnesota points. The price paid to the Minnesota farmer averages about three cents below the wholesale price of live poultry in the Twin Cities.

The third method of disposing of poultry in the rural districts is by sale to the local meat retailers or butchers. Although such buyers handle large quantities in some towns, most of them buy no more than enough to satisfy their own demands for local consumption.

A fourth outlet for market poultry in the country is a rather specialized class of dealers who buy for cash exclusively and for the purpose of this paper are termed "cash buyers." These dealers may be roughly classified as follows:

1. Individual buyers, each operating a single packing house.

2. Firms operating chains of six to a dozen or more houses who specialize in the purchase of poultry and other farm produce.

3. Resident agents of firms in distant cities buying on commission or salary.

4. Traveling buyers, acting independently or in the employ of a firm in another city, who contract for delivery at a certain time.

The first three classes are the most numerous and handle the bulk of the poultry sold at country points.

Dressing and feeding are two very important features of the poultry business. Nearly all cash buyers have facilities for dressing either at their own plants or at some point where they concentrate their purchases. Likewise many of them have provision for feeding of fowls, and all use considerable care in grading and packing. On live poultry with full crops it is customary in many places to subtract five per cent of the gross weight of birds.

In the dressing of fowls there is a loss of ten to twelve per cent. This percentage is inversely proportional to the size of the bird and consists of blood and feathers. This is offset to some extent by proceeds from the sale of feathers and ten per cent is usually considered as covering shrinkage in dressing. Turkey and chicken feathers do not bring as much as those of ducks and geese. Birds are either dry-picked or scalded. The eastern markets demand dry-picked birds and the fancier grades are always dressed in this manner. However, pin feathers may be more easily and more thoroughly removed by scalding and thus fowls that would grade No. 2 if dry-picked, on account of torn skins, are often enabled to grade No. 1 when scalded. When scalded fowls are to be placed in cold storage, it is highly important that the heads be not dipped as the appearance when kept for some time following this treatment is that of a diseased fowl and increases the difficulty of sale. The only kind of poultry that is scalded to any extent is chickens. To secure uniformity and care in dressing most buyers prefer to dress the chickens at their own plants.

Live poultry and dressed poultry are each divided into certain fairly well-recognized market classes. Each class is further divided into three grades known as "No. 1," "No. 2," and "culls." The details in these market classifications and quotations are variable. Chickens are divided into "springs," "fowls," and "cocks." The usual classes of "springs" with their respective weights are as follows:

"Peepers," 1¼ lbs. and under.
"Broilers," 1¼ lbs. to 2½ lbs.
"Fryers," 2½ lbs. to 3½ lbs.
"Roasters," 3½ lbs. and over.

"Springs" include all birds raised in a given year until after January 1 of the following year. After January 1 they are divided into two classes, viz., fowls and cocks. Fowls include hens under three pounds, hens three to four pounds, and hens four pounds and over. Cocks include males of all weights. Live ducks, geese, and turkeys are not so finely divided, and are separated to a large extent on the basis of age. Young birds of good weights find a more ready sale than old ones. Market divisions of dressed poultry are very numerous, and some packers have as many as a hundred lots, based on the manner of feeding, condition of birds, uniformity in size and weight, and manner of dressing. Discriminating markets encourage this fine subdivision and one of the severe criticisms of Minnesota dressed poultry has been the lack of care in grading and packing, although this is now being very efficiently done by many firms, especially the larger ones. The better grades are packed in boxes lined with parchment paper. Sometimes each bird is packed in a separate carton or wrapped in parchment paper. The poorer grades are packed in barrels containing 150 to 200 pounds, and the barrels themselves weigh about 22 pounds apiece. The barrels are lined with parchment paper, and after being filled, a piece of burlap is placed over the top. This is the usual way that country merchants pack all their shipments, irrespective of quality. The birds packed in boxes lined with parchment paper are carefully graded as to quality, color, and size and are packed twelve in a box. The different sizes of fowls cause a variation in the weights of the boxes. The barrel is a poor container on account of its unwieldiness and the danger of birds becoming misshapen in so large a package. Its one redeeming feature is its economy as compared with the box.

Nearly all cash buyers grade rather closely. In many cases where only a few birds of No. 2 grade are found with a preponderance of No. 1 fowls, there is a tendency to put all in as No. 1. Such instances require a slight adjustment of price from time to time to compensate for the cumulative losses incurred. Grading No. 2 stock as No. 1 hampers the improvement of market poultry by not placing a premium on good fowls.

Feeding is employed for the following purposes: first, to maintain birds; second, to fatten thoroughly, thereby making the meat tender and juicy; and, third, to bleach. The first is undertaken to prevent loss in car-lot shipments of live poultry to distant cities, and to prevent shrinkage in birds temporarily held for slaughter. In regard to the second it may be said that a great deal of poultry comes to market in a half-fat condition. By a couple of weeks of feeding there is a profit made on the feed consumed and a further profit on the increase in price for a higher grade. The improvement of the grade is perhaps the greatest gain to be obtained from feeding. Of not the least importance is the third purpose—the bleaching of the fowl—brought about by milk feeding.

The purchases of country merchants are frequently turned over to local "cash buyers" at one-fourth to one-half cent above the price paid by the merchant to the producer. Most of the sales of poultry by individual "cash buyers" in business on their own account and by buyers representing a group of houses sell outright either f. o. b. their own station, or f. o. b. destination, though some maintain representatives in large cities. These cash buyers ship largely to Minneapolis, St. Paul, and Duluth, but many ship direct to Chicago and eastern cities, and a few to Seattle and Winnipeg.

Of the methods employed in disposing of poultry at country points, the channel of the country store is least efficient. General merchants have not the facilities for handling live poultry or for packing dressed birds, and many of them would prefer not to bother with it. The local butcher is in a position to handle effectively only a limited amount—enough for his own trade. Shipment to city dealers or sale to local cash buyers appear to be the best outlets. As a general proposition it may be assumed that the sooner poultry is properly dressed, chilled, packed, and stored after leaving the hands of the producer, the better will be the product. It would seem, then, that decentralized plants for dressing and freezing would be very desirable in the marketing scheme. Cash buyers at country points who are provided with such conveniences have an important advantage. Only a few of them, however, have equipment for dressing and freezing and not all of these do it except in the fall and winter.

Those who never dress at their own plants and those who do so only periodically must transport their birds some distance before disposing of them. Thus they are placed on a par with the producer who markets by direct shipment. The disadvantage of shipping live birds is the loss in shrinkage, which amounts to three per cent or more depending on the delay in reaching market. Besides the actual loss in weight the quality is impaired. It is also less trouble for the farmer to drive to the house of the cash buyer in his own town, weigh his poultry, and get his check immediately.

The Wholesale Trade

The wholesale receivers of poultry in the Twin Cities, into whose hands shipments from the country are usually first delivered, are of two general classes, as follows:

1. Those who buy outright, deducting only the transportation charges, when making returns to country shippers.

2. Those who sell to a third party on a commission basis, charging for their services ten per cent of the gross selling price. The commission dealers subtract all charges including commission from the amount received for the goods consigned and remit the balance to the consignor.

No sharp line can be drawn between these two classes of dealers, because oftentimes a house that is handling country shipments on commission will be buying poultry from another wholesaler on the street. Most of them have facilities for killing and dressing at their own plants. Sorting and repacking is an important function of wholesale dealers. Degree of fatness, size, color, and freedom from blemishes are points to be considered in these operations. Some feeding is done by wholesalers but in most cases only for maintenance.

Early in the fall—September first—the different houses commence to send out advertising matter and price lists to several thousand addresses, including farmers, merchants, and cash buyers. It is the habit of dealers who buy outright to guarantee a certain price for about a week ahead of time. Prices on commission are subject to change without notice. As the season advances and the holiday period approaches, statements of market conditions are rendered more often but to a limited list of shippers. To active shippers price quotations are sent very frequently.

The Minneapolis dealers have an organization called the Minneapolis Produce Exchange. The traders meet here every forenoon at ten o'clock and make their bids and offers. Although comparatively little is actually sold on the exchange, prices based on sales are published daily in the so-called "Daily Market Reporter" not as official prices or quotations but solely for the purpose of keeping buyers and sellers informed.

Wholesalers receiving poultry dispose of their birds as follows:

1. By direct sale to retailers.
2. By sale to other wholesalers and jobbers usually in distant cities.
3. By sale to large consumers, such as hotels, restaurants, etc.
4. By placing in cold storage for future sale, and then selling in one of the first three ways.

About ninety per cent of the dealers have their own vehicles for delivery to retailers. Those who sell to wholesalers in distant cities usually ship only in car lots. The minimum weight on car-lot shipments is 20,000 pounds. These go forward in refrigerator cars which are carefully iced. The rate on dressed poultry in car lots is about twenty-five per cent higher than that on live poultry. The greater part of the shipments to points outside the State consists of dressed poultry.

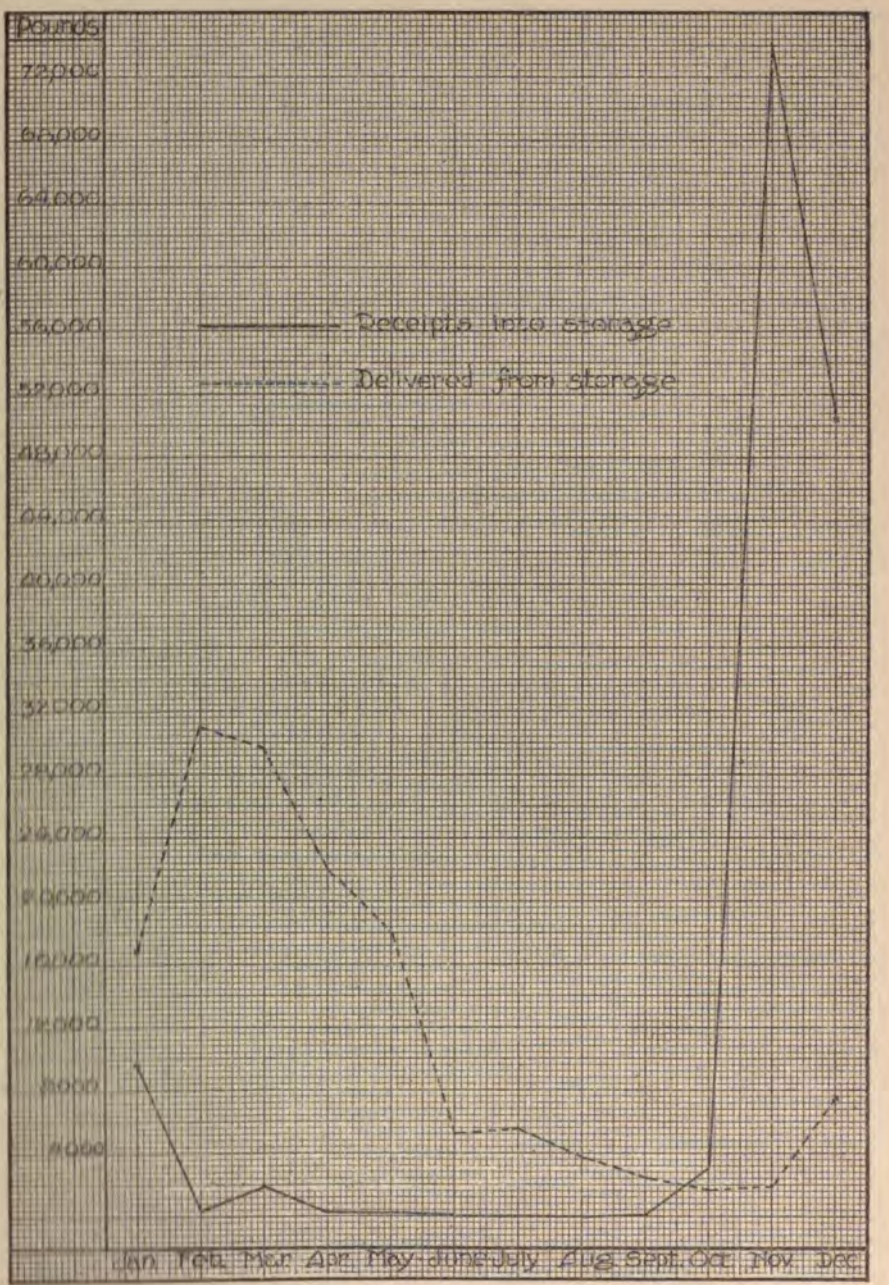
Cold Storage

About two thirds of Minnesota poultry is brought to market during October, November, and December. The demand for consumption at that period falls far short of the supply, and to prevent loss of the surplus it is placed in storage. Then during the time when but little fresh poultry is coming to market the supply in storage is delivered for consumption.

Facilities for preservation of poultry during the period of plentiful supply and while in transit are of the highest economic importance. Sudden and marked variations in the price are largely prevented by the use of cold storage, and the supply is distributed to conform to the demand. According to Bulletin 93 of the Bureau of Statistics of the United States Department of Agriculture, the average storage period for poultry does not exceed three months. This is undoubtedly contrary to general belief. The public has thought that cold storage products are kept for years and have been inclined to discredit statements of warehousemen on this point. The idea, held by consumers, that stored poultry is inimical to public health is born of prejudice and is not well founded. Circular No. 64 of the Bureau of Chemistry, United States Department of Agriculture, by Dr. M. E. Pennington (page 31) makes the following statement: "Poultry, even in the best condition, is not improved by being kept frozen for any length of time. About the sixth month of carrying, a careful observer, judging by the taste alone, can tell the difference between frozen poultry and that which is freshly killed. Up to nine months, however, this difference is so slight that it is of scarcely more than scientific interest."

According to Bulletin 93, previously referred to, 75.7 per cent of the poultry stored in the United States is delivered from storage in four months and more than ninety-eight per cent is delivered from storage before nine months have elapsed, and placed on the market before much deterioration in storage has taken place. It must be admitted that people at times have been ill after partaking of storage poultry. Let it be understood that this should not be blamed on cold storage itself. Poultry that has been held for sale until partially decomposed and then placed in storage is no better when it comes out than when it went into storage. Poultry for storage should be dry-picked and dry-chilled. Scalding, followed by cooling in cold water, fosters deterioration. Another important thing to be borne in mind in connection with storage poultry is the thawing after removal from storage. A very good place for doing this is in the dry air of an ordinary refrigerator, and it does not require over twenty-four hours. Storage poultry once thawed never keeps so well when refrozen. The time intervening between removal from the freezer and use of the cold storage bird should be as short as possible for best results. It has been charged by many that it is criminal to place poultry in storage without removing the entrails. Scientific investigations on this point show that drawn fowls decay much more rapidly than undrawn birds. The putrefactive bacteria seem to get a foothold very quickly and increase more rapidly after the fowl is drawn than when undrawn.

The rates for storage vary from one-fourth to one-half cent for the first month and from one-eighth to one-fourth cent for each succeeding month. Firms who store any great amount of poultry are given special



Receipts and Deliveries of Poultry by Months for a Twin City Cold Storage Warehouse, 1913

rates. Three-eighths of a cent per pound for the first month and one-fourth of a cent per month for each succeeding month is common. Over fifty per cent of the poultry stored goes into cold storage during November, December, and January. About seventy per cent of the amount stored is delivered from storage in November and December during the holiday season and in January and February. It will be observed that the storage year does not coincide with the calendar year. Probably seventy-five per cent of the total receipts of market poultry is stored for a short time at least. The accompanying figure shows the receipts and deliveries for a Twin City cold storage company.

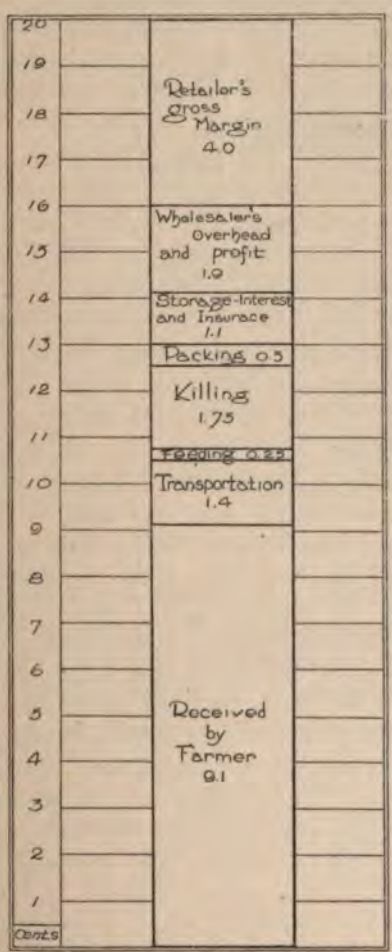


Diagram Showing Cost of Marketing Minnesota Poultry in Minneapolis under Conditions Described in Text

The Retail Trade

The retail trade at country points draws practically all of its supply direct from farmers. The retail trade of the Twin Cities draws nearly all of its supply from wholesalers. Retailers have satisfactory "coolers" for temporary preservation of small lots at their own establishments. Some buy more than is needed for immediate use during the fall and place it in a cold storage plant until needed. Some retailers cater only to the most select trade, and others deal with all classes. Nearly all of them deliver to consumers and the average cost of delivery as figured by them is ten per cent of the retail price. The demand for poultry is seasonal both as to yearly and weekly cycles. About two thirds of the sales by retailers take place on Saturdays. Under present conditions poultry to a very large extent must be considered a luxury, and is used most plentifully during holiday seasons and Sundays.

Analysis of Marketing Cost

Although definite and accurate data on the cost of marketing of poultry are rather difficult to secure, an estimate is presented below which indicates the various elements of cost incurred from the time a chicken is sold by the farmer to the time that it reaches the Twin City consumer. It is assumed that the bird is shipped by express direct to a Twin City buyer and that after killing and packing it goes into storage for three months. Although this is only one method of sale, the figures indicate approximately the main elements of expense of marketing chickens whatever channels of trade are selected.

TABLE IV

Analysis of Cost of Marketing Chickens

		Cents per pound	
Net to producer			9.1
Transportation		1.4	
Cost to wholesaler			10.5
Feeding		0.25	
Killing:			
Loss in shrinkage	1.0		
Labor and expense	0.75	1.75	
Packing		0.5	
Storage, interest, and insurance		1.1	
Wholesaler's gross margin (includes overhead and delivery costs and profits)		1.9	
Price to retailer			16.0
Retailer's gross margin		4.0	
Price to consumer			20.0

From this analysis it will be seen that when the consumer pays twenty cents a pound, the farmer receives 9.1 cents, or about 45.5 per cent. The margins of course vary; for example, the retailer may be selling for eighteen or nineteen cents a pound, thus cutting down the margin that he receives; or the wholesaler's gross profit may be smaller than that indicated, especially during a period of declining prices.

The total spread between producer's and consumer's price in this analysis is 10.9 cents. Of this total spread, transportation costs account for 12.8 per cent; killing (including shrinkage), 16.1 per cent; storage, interest, and insurance, 10.1 per cent; wholesaler's gross margin (out of which must be paid his overhead and delivery expenses), 17.4 per cent; and retailer's gross margin, 36.7 per cent. The retail store is the most expensive single step in the marketing process, and yet the margin taken at this step is only twenty per cent of final retail price.

MILK DISTRIBUTION IN MINNEAPOLIS AND ST. PAUL[1]

By W. L. Cavert

In any discussion of the problem of milk distribution it is well to bear in mind that the purity and cleanliness of the milk supply have such an intimate relation to infant mortality and the public health that the efficiency of any system is to be measured more by the effectiveness with which it safeguards the supply from dirt and the introduction of harmful bacteria, than by the financial economies of the system. And any system or method that contributes both to cleanliness of the milk supply and to economy in its distribution is to be doubly commended.

It may be said in general that cleanliness in handling and purity of supply are strictly opposed to low cost of distribution, except in so far as a large volume of business may enable certain companies to have a well-equipped plant and trained men to operate it at a comparatively small expense per quart. But it is also true that lack of financial ability to provide suitable equipment for carrying on the business is not the only factor that stands in the way of a more hygienic milk supply. The fact that dairymen consume without question the milk from their own unsanitary dairies suggests that many of the sins of the dairyman are to be charged to ignorance rather than to malicious intent. It is also worth while to point out that the dairyman's ignorance is equaled by that of a large proportion of his customers in their care of the product after it reaches their hands.

In general, two different systems of transferring milk and cream from the producer to the consumer are in use in Minneapolis and St. Paul. These may be called the direct and the indirect methods. By the direct method is meant the one in which near-by farmers deliver the products of their dairies directly to city consumers from their own wagons. By the indirect method is meant the system whereby the farmer sells his milk or cream to a wholesale dealer, who usually clarifies, pasteurizes, and bottles it, and then distributes it to stores, restaurants, or the ultimate consumer. While on paper the above classification may appear to be very definite and clear-cut, it does not follow that in practice there is an equally well-defined line of demarcation between the two systems, for a majority of the local

[1] The data for this paper were collected in April, 1913.

dairymen who distribute the products of their own dairies to the city trade from their own wagons, sell a portion of their product to stores and restaurants. Again, these dairymen are themselves frequently acting in the capacity of middlemen, when they increase the size of their business by buying the milk or cream of neighbors, who do not keep sufficiently large dairy herds to make it economical for them to run retail routes of their own. Again, some of the local dairymen, instead of making the family trade the major part of their business, have as customers a number of stores or restaurants to whom they make daily deliveries. With the understanding that it is frequently impossible to draw a clear-cut line between the direct and indirect systems, the principal features of each will be described.

The Direct Method

Dairymen who deal directly with the consumer may be divided into two classes according to the conditions under which they carry on their business: first, those who are within or so close to the city that it is impossible to secure land economically for pasture and the raising of winter feed; second, those who are so far removed from the city as to be able to furnish summer pasture and to raise a part of the winter feed. Most of the dairy farms near the Twin Cities raise all or a considerable part of their coarse fodder, but buy practically all of their grain.

In general, it may be said that the conditions surrounding the production and distribution of milk under the direct system are far from satisfactory from the sanitary standpoint. A fairly well-lighted and ventilated stable is the striking exception rather than the rule. The milk house ordinarily lacks nearly every one of the articles of equipment that are essential for the sanitary handling of market milk. An inventory of the equipment was taken on eighteen of these farms located near Minneapolis and St. Paul.[2] A steam boiler was found on five farms, and a bottling machine on three. Only two of the eighteen used cream separators for skimming the milk used for the cream supply, the usual custom being to raise the cream by setting the milk in ice water.

Of the total amount of milk sold by these dairymen, approximately twenty-eight per cent of the supply was bottled.[3] More or less bottling was done on fifteen of the eighteen farms. The general objection raised to bottling was the labor required when it was done by hand. The general custom was to bottle as much as was required for the store trade and for such of the family trade as expressed a preference for bottled milk.

[2] This investigation was made during the year 1912-1913; doubtless some improvements have been made since that time.

[3] In December, 1913, St. Paul adopted an ordinance requiring that all milk retailed to family trade should be bottled at the farm, or creamery of distributing agency.

In determining the expense involved in distributing milk by the direct method, a number of difficulties at once present themselves. Some of the more important ones are the following:

First, no aid can be secured from an investigation of the books of these farmer dairymen, because practically no accounts are kept. In determining costs where no accounts are kept, two methods of procedure are available. One is to outline a set of accounts and then induce a number of persons to keep accounts with adequate supervision. A cheaper, quicker, and fairly accurate method is to determine what items of expense enter into the business, to secure estimates from a large number of operators as to what their expenses and receipts have been during the preceding year, and then trust to the law of averages to correct any mistakes that the individual dairyman may have made.

Second, a dairyman who milks cows and distributes the product himself is conducting two distinct enterprises, the one having to do with the production of milk, the other with its distribution; but frequently the dairyman himself makes no distinction between the expense of production and of distribution. This overlapping of the two enterprises is well illustrated in the daily work of the driver. On these farms it is customary for the man who drives the milk wagon, whether he be proprietor or hired man, to help with the milking both morning and evening. From two to four hours per day are usually spent in this way by the driver. When the man is milking he is spending time on the production end of the enterprise, but when he is bottling milk or delivering milk to his customers, he is putting time on the distribution end of the business. If costs are to be determined, some fair system must be devised of distributing the labor cost between the two enterprises.

Third, a number of items of expense involving the depreciation of horses, wagon, and other equipment are very difficult to estimate correctly, because no figures have been kept and depreciation charges are more or less neglected by the operators.

In an attempt to determine the approximate cost of distribution by the direct-to-the-consumer method, twenty-one of these farms were visited and estimates were secured as to the inventory value of the equipment used in the distribution part of their business on April 1, 1913, the expenses of distribution, the amount of milk, cream, and skim-milk handled daily, the price received for same, the amount of milk bottled, number of cows milked, etc. Fairly satisfactory records were secured from eighteen of the twenty-one farms. The figures secured from these eighteen farms were tabulated and summarized as indicated below. It is believed that the average drawn from estimates on eighteen farms will give the approximate cost of distribution by this method, but it is recognized that the number is

not sufficiently large to allow a highly satisfactory study of the factors that make for economical distribution by this system.

For some items of expense it was found advisable to fix arbitrary standards according to the judgment of those best informed on the business, for the reason that estimates are not of very great value unless they are based on a fairly intimate knowledge of the subject concerning which an estimate is asked. The following arbitrary standards were used:

Feed, shelter, and miscellaneous cash expenses of a horse per year	$100.00
Yearly depreciation of a horse per year, figured on the basis of a $200 horse giving five years of service and having a value of $50 at the end of that period	30.00
Yearly depreciation of a wagon figured on the basis of a first cost of $200, and a five-year period of usefulness, with a value of $25 at the end of five years	35.00
Yearly depreciation of a harness per double set, figured on the basis of a first cost of $40, with ten per cent depreciation	4.00
Depreciation of a sleigh per year	6.00
Allowance for cost of fuel in cases where hot water for cleansing was secured by use of the kitchen stove	15.00
Wages per hour allowed for farm work by drivers of milk wagons	.16

A new milk sleigh costs $150 or more, and the annual depreciation would be from ten to twenty per cent, but the average cash value of the sleigh on these eighteen farms was only thirty-six dollars. This low valuation was caused by the fact that in some cases the box to the wagon is placed on runners, and in others a second-hand sleigh is secured at a cost of from ten to fifty dollars and made to serve for the short season when a sleigh is needed. In the few cases where bottling machines and steam boilers were kept, ten per cent on the original cost was allowed for depreciation. In the case of bottles and cans, the amount expended during the year was allowed to offset the depreciation.

The cost of shrinkage was determined by securing the farmers' estimates as to how many quarts of milk he ordinarily secured from a five-gallon can. The cost of shrinkage was computed on the wholesale value of the milk. The following prices were arbitrarily used as the wholesale value of the milk that was lost between producer and consumer:

Wholesale price of milk per gallon during the months of October, November, December, and January	$0.18
Wholesale price of milk per gallon during the months of April, May, June, July, August, September, February, and March	.16
Wholesale price of milk per gallon during the months of April, ber, November, December, and January	.72
Wholesale price of cream per gallon during the months of April, May, June, July, August, September, February, and March	.64

The above prices are about twelve per cent higher than could have been secured at Minneapolis creameries, but there is a wholesale market available to these dairymen where they sell to restaurants or other peddlers, so the above figure may be considered approximately correct.

A summary of the conditions surrounding the distribution of milk by the direct-to-the-consumer method in the Twin Cities, may best be shown by presenting the average results secured by tabulating the estimates of investment and operating costs of the eighteen farmers.

TABLE I

AVERAGE INVESTMENT IN EQUIPMENT FOR THE DISTRIBUTION OF MILK AND CREAM ON APRIL 1, 1913

Horses	$458
Milk wagon	127
Sleigh	36
Harness	23
Bottles and cans	44
Miscellaneous	25
Total investment	$713

TABLE II

AVERAGE EXPENSES OF DISTRIBUTING MILK FOR YEAR FROM APRIL 1, 1912, TO APRIL 1, 1913

Wages and board of driver	$721
Wages of assistant, including board furnished*	241
Bottles and caps	34
Bad debts	39
Shrinkage and breakage	248
Milk tickets	11
Fuel	27
Ice	56
Miscellaneous supplies	7
Repairs to wagon, sleigh, and harness	39
Shoeing horses	70
Feed cost, shelter, and cash sundries for an average of 3.22 horses.	322
Depreciation of horses and equipment	146
Interest on average investment of $713 at 5 per cent	36
Total expenses per year	$1,997
Value of farm work done by drivers per year at 16 cents per hour.	224
Net cost of each route per year	$1,773

* Driver had an assistant for a part or all of the time. Some drivers had no helpers at any time during the year.

TABLE III

AVERAGE SIZE OF BUSINESS

	Gallons sold April 1, 1912 to April 1, 1913	Receipts April 1, 1912 to April 1, 1913	Average gallons sold daily	Average daily receipts
Whole milk	22,126	$5,908	60.6	$16.19
Cream	847	918	2.3	2.52
Skim-milk	2,176	212	6.0	.58
Total	25,149	$7,038	68.9	$19.29

A half pint of cream is ordinarily sold for the same price as a quart of milk, and among milk firms that keep cost accounts, a half pint of cream is always regarded as the equivalent of a quart of milk in figuring cost of distribution. The same system has been followed in this study. In apportioning the expenses of distribution between whole milk, cream, and skim-milk, a quart of milk has therefore been treated as the equivalent of a half pint of cream. Among milk dealers the expression "point" is used. A "point" means either a quart of milk or a half pint of cream, and the amount of business done by a retail wagon is often stated in terms of "points." It has been assumed that the expense of distributing skim-milk is in proportion to the money received from it.

TABLE IV

DISTRIBUTION OF EXPENSE BETWEEN MILK, CREAM, AND SKIM MILK

	Percentage distribution of receipts	Distribution of expenses
Milk and cream	97	$1,720
Skim-milk	3	53
Total	100	$1,773

TABLE V

COST OF DISTRIBUTION PER "POINT"

Net cost of distributing milk and cream per wagon per year	$ 1,720	
Total number of "points" handled per wagon during year	102,056	
Cost of distribution per "point"		$.0169

An arithmetical average was also secured by finding the cost of distribution per point on each farm, and then taking the average of the eighteen farms. This kind of an average has the advantage of regarding each

farm as an individual experiment in the cost of distribution and so gives each farm equal weight in the average, irrespective of the amount of yearly business. When this was done the average cost of distribution per point was $0.0185. In considering the above figures it should be remembered that twenty-one per cent of the milk on these farms was sold at wholesale to stores and restaurants. If allowance were made for the fact that milk can be delivered to stores and restaurants in wholesale quantities at a cheaper rate than to families, the actual expense of delivering to family trade would be slightly greater.

Two dairymen reported that they had no loss from shrinkage and breakage. The most frequent estimate as to shrinkage of milk dipped from cans in the street was two quarts per five-gallon can, or ten per cent loss. In the case of bottled milk, the most frequent estimate was a loss of one quart per five-gallon can, or five per cent loss.

If these two dairymen escaped this loss, it must have been because they gave a less liberal measure than their competitors, and so placed this charge on the final consumers. Only five of the eighteen dairymen reported a loss of five dollars or more per year from the carrying of surplus milk. When a milkman starts on his route, he is never able to tell exactly what amount of milk and cream his trade will require on that particular day. The loss seems to be avoided in most cases by carrying any unsold milk back home, placing it on ice and selling it out to the first customers visited on the following day. The large dealers report that they always use any unsold milk for making butter instead of placing it on the market the following day.

The figures as to cost of distribution by the direct-to-the-consumer method indicate that this system is financially more economical than the indirect method, but considering the fact that about seventy-two per cent of this milk is dipped from open cans on the street (in 1912-1913), that only a fraction of this class of dairies has steam available for sterilizing purposes, and that only an occasional one of these dairymen has been educated to the point where he has any adequate idea as to the requirements for the production and distribution of a reasonably satisfactory grade of milk, it is difficult to wax enthusiastic over the efficiency of the direct-to-the-consumer method as applied to milk distribution. However, there is an occasional dairyman of this class who takes a justifiable pride in the grade and cleanliness of his product, but inasmuch as pride in his product is almost the only extra return that the careful dairyman receives for his trouble over that received by his ignorant and slovenly competitor, the number of careful, cleanly, dairymen is not likely to increase very rapidly.

There seems to be a slight tendency for the direct-to-the-consumer dairymen to undersell the large milk companies. In April of 1913 the large milk companies were making a price of seven cents per quart to the family

trade, while eight of the eighteen local dairymen visited were giving fifteen quart tickets for a dollar, or a price of six and two-thirds cents per quart.

The consuming public of the Twin Cities has not responded generally in a way that has been financially encouraging to efforts on the part of a few progressive dairymen to furnish a high-grade milk supply. A leading Twin City dealer states that no attempt on the part of dairymen or dealers to furnish a sanitary grade of milk at an advanced price has been financially successful to those who have undertaken the venture. In purchasing eggs the consuming public will readily pay an advanced price for a superior article since any inferiority in quality is readily detected. In the case of milk, although a low bacterial count is one of the most important tests of high quality, the average consumer is ignorant of this, and judges quality almost entirely by the amount of cream that appears to be present. There are two reasons why the consumer attaches so little importance to the bacterial count: First, the average consumer has not been educated to the importance of the bacterial count in determining quality; second, the bacterial count can only be made by a trained scientist, and such findings are not available ordinarily except in so far as the results of bacterial counts made by city health departments from the milk offered for sale by the different dairymen are published in the local papers.

In the case of certified milk, the conditions under which the milk may be produced and handled are prescribed by local medical associations, so that the consumer who purchases a certified brand is assured of receiving high-grade milk. However, the average consumer seems to regard the price of these guaranteed brands as prohibitive except in so far as they are used to a certain extent for special purposes, such as the feeding of infants.

The Indirect Method

As already explained, the indirect method of marketing milk refers to the handling of that part of the supply where some third party intervenes between consumer and producer. The milk that reaches the consumer by the indirect method is produced by farmers living so far from the city that it is not economical for them to deliver directly. Two methods of transportation are employed—railroad and teams. In some cases, milk is hauled a distance of twenty miles by team, and most of the milk that is produced within fifteen miles of the city is hauled in this way. Bulletin No. 53 of the State Dairy and Food Commission, published since this investigation was completed, shows data to the effect that about half of the Minneapolis milk supply is furnished by the local dairymen and about half by the large creameries. The same authority states that of the half distributed

by the large creameries about half is hauled in by team from Hennepin, Anoka, and Ramsey counties. The other half of the supply is shipped in by rail. Two thirds of that shipped by rail comes from Goodhue, Rice, and Dakota counties. From this it will be seen that the great bulk of the Twin City supply comes from within a radius of sixty miles.

The reasons for hauling by wagon are that it is just as cheap as railroad transportation, and that it has the advantage of delivering the milk at the dealer's place of business, rather than at the railroad station. Moreover, the milk hauled by wagon usually arrives in better condition because the wagon can start out when the milk is ready, while the trains frequently run too early in the morning to suit the convenience of the farmers, or too late in the day to bring the milk into the city in the best condition. But little milk is hauled by teams from the territory served by the "Dan Patch" Electric Line, since this line has convenient train schedules and a regular system of city delivery. None of the railroads offer refrigerator cars for the transportation of milk.

The milk delivered by the farmer to the morning milk trains is that from the milkings of the evening before and the same morning. This milk ordinarily reaches the city milk company about noon of the same day, and during the afternoon it is clarified (that is, all undissolved dirt is removed by special machinery), pasteurized, aerated, and bottled, and then held at a cool temperature for delivery on the following morning.

The only milk bottled in the country is that used for the certified and inspected grades which retail at fifteen and twelve cents per quart respectively. It is generally admitted that country bottling stations are desirable from a sanitary standpoint, because then the milk can be clarified, pasteurized, and bottled as soon as it is received from the farmer. The dealers in the Twin Cities state, however, that from the standpoint of economy country bottling stations are not desirable, due to the extra freight and breakage in transporting bottled milk, and to the unnecessary duplication of equipment involved.

The larger part of the milk supply is purchased by the city milk companies directly from individual farmers and a minor portion from local creameries which were originally established for the manufacture of butter and cheese but which now sell all or a part of their receipts of milk and cream to Twin City milk dealers.

The creameries within fifty miles of the city frequently make butter during the summer, when the supply of milk is abundant, and sell their milk for the city trade during the seasons when there is a keen demand for their milk. City dealers utilize this extra supply to make up for the shortage that always occurs in late fall and early winter. The result is that during the shortage season these creameries are able to sell at a higher price than the producers who have yearly contracts with the city dealers.

Some of the creameries that are between twenty and forty miles from the city sell a large part of their receipts in this way. Frequently these country creameries are coöperative organizations, and in that case the creamery acts for all practical purposes as a coöperative selling agency.

There are two Twin City milk companies each of which owns one or more country creameries. The owners have the creameries make butter or cheese during the early summer when the supply of milk is abundant; at other seasons they use the milk received by these creameries for their city milk trade. There is no organization at the present time among those who sell direct to the city dealers, but in at least one case reported to the writer a group of neighbors had an informal coöperative selling agency in that they selected a committee to negotiate with the city dealers, and the group then abided by the contract that their representatives were able to secure.

Sales are made by the producer in two ways: either a contract is signed by both parties for a year or other specified period that the contract is to run, or the farmer delivers his milk to the city dealer at a price that is determined from month to month according to the state of the market. Two dealers report that it is their practice to require the farmer to contract to furnish at least two thirds as many gallons daily in the months of November, December, and January as in the months of May, June, and July, but that no penalty is fixed in the contract, in case of failure to comply with this requirement.

A large part of the milk is bought on the gallon basis, but there is a strong feeling among the dealers that the butter-fat basis is more desirable. One of the avowed objects of the conference of the milk dealers in September, 1912, that led to the fining of five firms, was the bringing-about of a uniform system of buying from the farmers on the butter-fat basis. Inasmuch as the large companies standardize their product (that is, mix all their milk together and then either add or remove cream until it has a certain standard per cent of butter fat, usually three and one-half per cent), the question of purchasing according to the butter-fat basis is a very important one to them, but competition among the dealers in purchasing from the producer seems to prevent the general adoption of the butter-fat basis. At present, almost the only part of the city milk supply that is purchased by the dealers on a butter-fat basis is that secured from creameries.

There is a slight tendency among dealers to discriminate against milk that comes from farmers who usually furnish a product low in butter fat, but in general it may be stated that there is but little incentive for the producer to keep breeds of cattle that will furnish a high percentage of butter fat in the milk, or to use any particular care in keeping his stables and milk house in a clean, sanitary condition. In securing im-

proved service of any kind, no incentive has been found equal to that of increased financial returns for well-doing, and it is unreasonable to hope for any great improvement in the quality of our milk supply until some system is worked out that will reward the producer of a high-class article in proportion to the extra expense that its production entails.

It appears that far too much attention is given to the question of butter-fat content in determining quality and far too little to the sanitary conditions surrounding the production and handling of milk. One of the reasons for the use of the butter-fat test in determining quality is the fact that it is very easy to determine the fat content, while it is more difficult to work out a system of payment graded according to the sanitary conditions surrounding the production and handling of milk.

Statements were secured from eight Twin City dealers as to the average prices paid for milk delivered in the city of St. Paul or Minneapolis. The average price per gallon paid for each month from April, 1912, to March, 1913, inclusive follows:

April, 1912	$0.1350
May, 1912	.1225
June, 1912	.1200
July, 1912	.1240
August, 1912	.1325
September, 1912	.1400
October, 1912	.1525
November, 1912	.1563
December, 1912	.1588
January, 1913	.1538
February, 1913	.1500
March, 1913	.1450
Average	$0.1409*

This price represents the cost of milk to the city dealer, except that when it comes by rail there is the additional cost of hauling from the freight station to the plant. The average transportation charge is about two cents per gallon either by railroad or team. Where milk is hauled to the city by team the teamster ordinarily receives two cents per gallon. In some cases groups of farmers take turns among themselves in hauling their milk to town.

* In many sections of the United States milk is sold by the hundredweight. Taking the specific gravity as 1.032, the corresponding price per hundredweight would be $1.64. Deducting two cents per gallon as the transportation charge, the average per hundredweight price to the farmer would be $1.41.

There are four distinct methods by which the milk is distributed to the consumer from the plants of the large dealers.

1. It may be delivered directly to families from the retail wagons of the milk company.

2. It may be sold to stores at a price of one cent per quart less than the retail price.

3. It may be sold, after it has been clarified, pasteurized, and bottled, to peddlers who own their own horse and wagon. Peddlers are ordinarily charged about two cents less than the retail price with varying provisions as to the privilege of bringing back unsold milk.

4. It may be sold to restaurants, hotels, hospitals, and bakeries in five-gallon cans, after being clarified and pasteurized. Prices on can milk respond to differences in supply more readily than do the retail prices. The range of prices on can milk from April 1, 1912, to April 1, 1913, was from about sixteen to twenty-two cents per gallon. The average for the months of April, May, June, July, August, September, February, and March would be about eighteen cents, while the average for the months of October, November, December, and January would be about twenty cents per gallon.

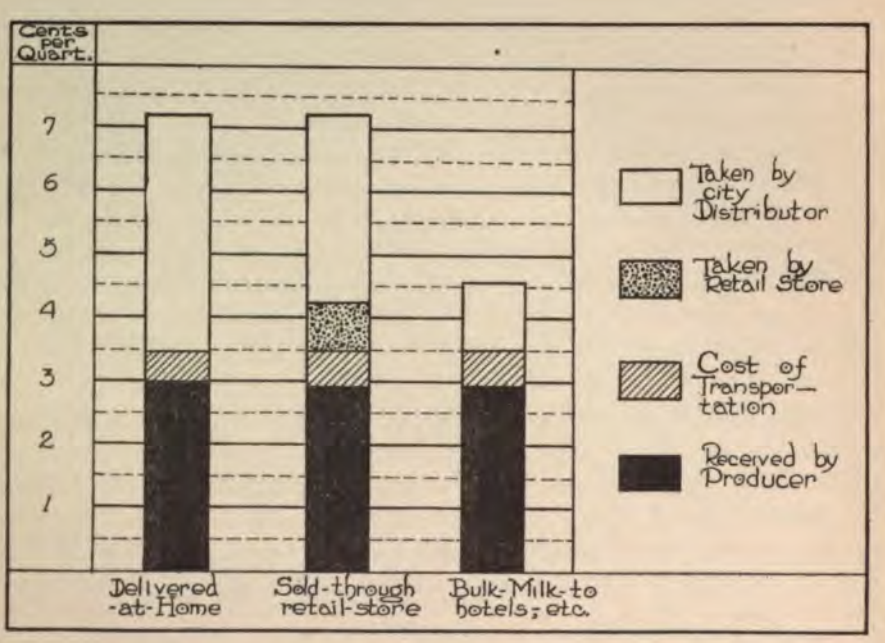


Diagram Showing Elements of Final Price of Milk Shipped into Minneapolis and Sold through Various Channels. (The figures are averages for the year ended March 31, 1913)

The following tables give the approximate distribution between producer, transporting agency, and the one or more middlemen, of the average retail price of a quart of milk. From April 1, 1912, to April 1, 1913, the retail price was eight cents per quart for four months, and seven cents for eight months, giving an average retail price of seven and one-third cents. It should be stated, however, that there were one or more dealers who did not raise the price to eight cents per quart during the winter months.

TABLE VI

MARGIN THAT EACH AGENCY SECURES FOR ITS SERVICES WHEN MILK GOES FROM CITY DEALER DIRECT TO THE FAMILY

Agencies receiving a portion of the retail price	Amount going to each agency (per quart)	Per cent of retail price
Farmer	$0.0302	41.2
Transportation from producer to city	.0050	6.8
City distributors	.0381	52.0
Total	$0.0733	100.0

TABLE VII

MARGIN THAT EACH AGENCY RECEIVES WHEN SOLD THROUGH DEALER AND RETAIL STORE

Agencies receiving a portion of the retail price	Amount going to each agency (per quart)	Per cent of retail price
Farmer	$0.0302	41.2
Transportation from producer to city	.0050	6.8
City dealer	.0281	38.3
Storekeeper	.0100	13.7
Total	$0.0733	100.0

TABLE VIII

MARGIN EACH AGENCY RECEIVES WHEN THE CITY DEALER SELLS CAN MILK TO RESTAURANTS, HOTELS, BAKERIES, ETC.

Agencies receiving a portion of the retail price	Amount going to each agency (per quart)	Per cent of price paid for can milk
Farmer	$0.0302	64.7
Transportation from producer to city	.0050	10.7
City dealer	.0115	24.6
Total	$0.0467	100.0

In the case of can milk, the average price to the restaurant keeper, bakery, etc., has been figured at 18.67 cents per gallon, or 4.67 cents per quart. This price was secured by taking an average price of eighteen cents per gallon for eight months and twenty cents per gallon for four months.

The fact that dealers are willing to take an average margin of 2.66 cents per quart less on can milk than on bottled milk delivered to families, indicates that the difference in price represents the approximate difference in cost of handling and delivering to the family trade as compared to wholesale trade.

At the time that the milk companies of Minneapolis were in the courts during the winter of 1912-1913 charged with conspiracy in restraint of trade, the then Minneapolis Milk Company published a statement in the Minneapolis papers as to the cost of distribution of milk as shown by cost accounts kept by that company. The author has no means of estimating the accuracy of this statement but believes that it is approximately correct. The figures then published are as follows:

Average price paid in the country from October 1, 1911, to October 1, 1912..	$0.0288
Transportation charges from the country station to city railway depot.....	.0056
Total cost to city.....	$0.0344
City expenses—	
Team and drivers' expenses, hauling milk from railroad cars to milk depot and return of empties.....	$0.0004
Labor for handling milk, washing and sterilizing cans and bottles, for pasteurizing, bottling, and capping of bottles, including loss and breakage..	.0077
Power, refrigeration, and light.....	.0007
Team expenses and horses, wagons, and harness.....	.0059
Salaries of deliverymen, helpers, foremen, and collectors.....	.0127
Bookkeeping, stationery, advertising matter, telephone, and bad debts.....	.0039
Shrinkage and loss in carrying surplus.....	.0047
Total city expense.....	$0.0360
Total cost of milk.....	.0344
Grand total	$0.0704

In conclusion, it has been shown that the cost of marketing milk by the direct-from-farm-to-consumer method is from 1.69 cents to 1.85 cents per quart depending on the method of calculation, as compared with well over three cents by the indirect method through large city dealers. By the latter method, however, the services performed in transportation, hauling, clarifying, pasteurizing, bottling, etc., are vastly more difficult and complex than by the former method, and the quality and cleanliness are superior. As a city increases in population it is able to draw a smaller and smaller proportion of its total milk supply from the territory immediately

adjacent, and therefore has to go farther and farther into the country. The wide spread between producer and consumer is due to heavy expenses of distribution and not to high profits obtained by the large milk companies, The principal problems connected with supplying a large city with milk are those of sanitation and of devising some system whereby the producer of high-quality, sanitary milk will receive greater returns than his careless and ignorant competitor.

MINNEAPOLIS CENTRAL CITY MARKET

By R. Maynard Peterson

As a food-distributing center, Minneapolis is important both as a collection point for products of the Northwest for distribution to other parts of the country and as a collection point for products from other parts of the country for distribution not only to city consumers but to other northwestern points. Since the city has a population of about 340,000 inhabitants, the distribution of products within the city itself presents problems common to other large cities of the country. An important feature of the marketing machinery is the Minneapolis Central City Market, not publicly owned as in many cities of the country, but a privately owned market place to which the farmers within hauling distance of the city may haul their products.

The growers around Minneapolis may sell their products through any of the following channels: Central City Market; commission men; retail stores; or shipment to other markets. Some growers have a special trade with city retail stores, but this is not a common practice. Most of the local fruits and vegetables are brought directly to the city market, where they are sold to retailers, commission men, and consumers, although many loads are sold in advance to commission men. Growers do not deal with commission men exclusively, and very little is shipped by local growers to outside markets. The growers need no license to sell their products at the Central Market and they may sell to whomever they please. If they have any vegetables left that they are unable to dispose of at the market, they often unload to a dealer on "Commission Row" at reduced rates or supply some grocer on the way home. Sometimes parts of the load are taken home to be brought back the next day.

Previous to the nineties, Minneapolis had no organized market place. The wagons were backed up to the curb on Bridge Square where the vegetables were exposed to the sun or rain until disposed of. This arrangement was entirely unsatisfactory and there was much agitation for a municipal market on the part of the growers. The city, however, refused to come to their assistance, so Mr. Gale, who was then a sort of market master, took the matter up with Mr. T. B. Walker and Major Camp, advising them to build a market as a private enterprise. These two men took the matter up with the City Council, who promised them free water and abatement of taxes, if they would construct and operate a central market. Subsequently

Minneapolis Central City Market

in 1892 Mr. Walker and Major Camp erected sheds and buildings covering the block between Sixth and Seventh Streets and Second and Third Avenues North.

In less than a year and a half the entire court was destroyed by fire. Major Camp refused to rebuild, so Mr. Walker erected new buildings on the same site and they stand to-day, practically the same as they were built at that time, except that the sheds run parallel to the streets instead of parallel to the avenues. It is interesting to note that the abatement of taxes did not last long and that free water for keeping the court clean was never furnished, according to a statement made by Mr. T. B. Walker.

The market court has three sheds which are twelve feet wide and 330 feet long, with stalls on each side, which are six feet wide. The wagons back up to raised platforms, which extend the full length of the market, and on these the products are displayed. The stalls are wide enough to accommodate the customary wagons, but the large trucks now coming into use need more space. This same condition exists in regard to the driveways between the sheds which are forty-five feet wide. During the early part of the season, these driveways are sufficiently wide to handle the traffic, but later, when the market is in full swing, with from 400 to 500 gardeners' wagons, it is almost impossible for teams to get in or out. On either side of the court there is a long narrow building, which is used for retail stores and restaurants. The walk in front of the south building has stalls for berry and apple growers who do not have regular stands for the entire season. There are, in all, 366 stalls and twenty-five retail stores and restaurants.

The market opens the first Saturday of May each year and continues until cold weather and snow prevent the growers from driving to town. Stalls for the entire season cost twenty-five dollars each, and for the berry season only, ten dollars each. A stall may be rented by two gardeners, who may occupy it on alternate days. Transients are charged twenty-five cents a day for the use of a stall. When a grower signs up for a stall, he agrees to the following rules and regulations:

"It being a special agreement under which this stand is rented, that the tenant only has the use of the same when personally occupying it with his wagon, with the horses off, and the pole or shafts detached and out of the way, and he is not to sublet for any part of this season nor have any control over the occupancy of this stand except when he is personally using the same, and it is optional with the Central City Market Company to put any other tenant in this stand when it becomes vacant, either by the absence of this tenant or by his non-payment of rent when it becomes due. The tenant occupying this stand also agrees not to deposit any decayed or spoiled vegetable matter on this stand or on the pavement in the driveway in front of this stand, and that all such refuse matter he may have on his load he

will remove from the market place, and that no huckster business will be done on this stall, and no sales to be made before 6 a. m."

By huckstering is meant in this contract the buying of products by a grower for the purpose of reselling on the Central Market. This regulation does not apply to certain stalls, twenty in number, which are rented expressly for the purpose of buying and reselling. Huckstering as a general practice on a market of this kind is not to be encouraged, but the setting aside of a few special stalls for this purpose helps to keep the market normal. Occasionally a man will come in with a load of one particular commodity, such as green onions or radishes. He may be a grower who comes to the market but rarely and does not know the general trend of prices, or he may knowingly cut the prevailing price heavily so as to run no chance of having to take his load back with him. If huckstering were not allowed, the market on that particular article would go to pieces and the other gardeners would be compelled to meet his price if they wished to sell out. This, however, is prevented by the hucksters who are always looking for an opportunity to buy at a low figure, enabling them to make a profit by reselling at the usual price. They occupy a position analogous to the "scalper" in the grain and live-stock trades.

This market is strictly a local growers' market and only local products can be sold on it. If shipped-in fruits and vegetables could be handled along with home-grown stuff, the competition would in times of plenty cause a heavy slump in prices. The market master realizes this and is always on the lookout for products that have been shipped in. This one ruling has been one of the most important factors in giving the Central Market of Minneapolis the reputation of being a most advantageous one from the standpoint of the local grower.

The market court itself, according to figures furnished by the market master, is far from being a paying proposition to the owner. The question naturally arises, Why does Mr. Walker continue to operate it at a loss? His explanation is as follows: He owns most of the buildings occupied by men commonly known as commission men, who buy and sell produce. These buildings are located near the market court and have a high rental value because of their location. If the market were to be moved to another part of the city, these buildings would depreciate in value very quickly.

The local growers have organized the Minneapolis Market Gardeners' Association. They are represented on the market by a committee of three who settle disputes of the various members, particularly when disputes arise with the market master. This association also exhibits a large display of fruits and vegetables at the Minnesota State Fair each year.

The Minneapolis market draws on a large territory, gardeners coming in from a radius of ten miles and, in a few cases, coming as far as fifteen miles. The market draws, not only from its normal territory, but also

from territory that should belong to St. Paul. There are approximately thirty-five gardeners coming to Minneapolis who live closer to the St. Paul market. Three of these gardeners live beyond St. Paul, one of whom drives past the market in that city each morning as he comes to Minneapolis. These gardeners claim that they are able to obtain enough better prices to warrant their coming the extra distance. One celery grower, who lives near the St. Paul market, says that he has to get up at one o'clock in the morning in order to reach the Minneapolis market before it opens. Of the fifty-nine gardeners that were interviewed, only one came from a distance of less than four miles; thirty-one came from four to six miles; and twenty-seven from seven to ten miles. The average distance was six and three-fourths miles. Fifteen per cent of the gardeners questioned delivered their products with automobile trucks, but this percentage would be much lower, probably less than five per cent, if all gardeners were considered. Only a portion of the gardeners come to market every day. Out of forty-two who were questioned on this point, seven came only three days per week, nine came four days, and twenty-six came five or six days, the average number coming a little less than five days per week.

Of these same forty-two gardeners, seven received fifteen dollars or less as an average income per load, twenty-eight received from twenty dollars to fifty dollars per load, and seven obtained over fifty dollars. The average received per load by the total forty-two gardeners was thirty-four dollars. Judging from the fact that the average gardener comes a little less than five days per week, his weekly gross income during the marketing season would be about $160. Those farmers who come long distances three times a week with small loads really obtain very small recompense for their trouble, whereas many with large loads receive a fairly satisfactory return.

Although this market is mainly a wholesale market, it is also a consumer's market, and in the morning one may find from one hundred to four hundred consumers with baskets on their arms. They consist mostly of either the wealthier or the poorer classes, the middle class rarely coming except those few who run boarding houses, or who live very near the market. The wealthier class come in automobiles, leaving maids at home to do the housework. The middle class do their own work largely and do not find time to go to the market. On the other hand, the poor people, who also do their own work, are driven through necessity to take time enough to buy where foodstuffs are cheap. It is amusing, as well as instructive, to watch the various consumers drive their bargains. Some will approach a large box of lettuce, ask the price per dozen, and then go through the whole box looking for the largest heads. After turning most of the lettuce upside down, they open their purse and expect to pay for the two best heads in the box at the dozen rate. The gardener generally tells them that

he does not sell in less than dozen lots, while as a matter of fact he may be selling, to other consumers, two or four heads at the same rate that he sells a dozen heads to the grocer.

Practically the same consumers come to the market throughout the whole season, and they become pretty well known. Those who are in the habit of asking the price, taking the normal run of the products if they are satisfied with that price, or passing it up without argument if they are not satisfied, are the ones who get what they need at wholesale prices. There are some gardeners, however, who will always raise the price as soon as they see a consumer coming, but they are the exception rather than the rule, and anyone who has passed down the row asking prices knows at once that these growers are not setting the usual price. Anyone who is reasonable in his dealings can buy anything on the market at wholesale prices and get most things in fairly small quantities.

The following list shows the units of measure by which the products are sold. In some cases the units are too large for the ordinary consumer; for example, one-half bushel of string beans. But in these few cases several consumers can club together and take advantage of the wholesale price. Where a unit of measure is qualified by the words "or less," as in the case of asparagus, it means that practically any quantity can be purchased.

Vegetables

Asparagus, dozen bunches, or less.
Beans, string, bushel or half bushel.
Beans, Lima, quart.
Beets (by the bunch), dozen, or half dozen.
Beets (in bulk), one bushel.
Cabbage, one or one-half dozen heads.
Carrots (in bulk), one bushel.
Carrots (in bunches), one dozen or one-half dozen.
Cauliflower, one dozen or one-half dozen heads.
Celery, one dozen bunches.
Corn, one dozen ears.
Cucumbers, one bushel or one dozen; less than dozen when out of season.
Egg plant, one dozen, or less.
Endive, one dozen, or less.
Leek, one bunch.
Lettuce, one dozen or half dozen heads.
Muskmelons, one bushel or one dozen, or less.
Onions (green), one dozen or one-half dozen bunches.
Onions, (in bulk) one bushel.
Parsnips, one bushel.

Peppers, one dozen.
Peas, one bushel, or one-half bushel.
Pumpkins, one dozen, or less.
Potatoes, one bushel.
Radishes, one dozen, or one-half dozen bunches.
Rutabagas, one bushel.
Rhubarb, bushel basket, containing 35 to 40 lbs.; or sometimes sold by the bunch.
Salsify, one bunch.
Spinach, one bushel.
Squash, one dozen, or less.
Turnips (in bunches), one dozen, or less.
Turnips (bulk), one bushel.
Tomatoes, one bushel.
Watermelons, one dozen, or less.

Fruits

Apples, one bushel.
Currants, one crate.
Gooseberries, one crate.
Grapes, one basket or crate.
Plums, one bushel.
Raspberries, one crate.
Strawberries, one crate.

Plants

Asters, one crate of one dozen baskets, or one basket of one dozen plants.
Cabbage, one crate of one dozen baskets, or one basket of one dozen plants.
Cannas, one dozen plants.
Geraniums, one dozen plants.
Pansies, crate of one dozen baskets, or basket of one dozen plants.
Tomatoes, crate of one dozen baskets, or basket of one dozen plants.

Quotations for Minneapolis produce are given daily in both the *Minneapolis Journal* and *Minneapolis Tribune*. Little attention is paid to the Central Market in arriving at the quotation, which is obtained largely from the wholesale dealers. This price list is supposed to be checked up each day, but a careful study of the market shows that the quotations on fruits and vegetables are neglected at times. This was particularly noticeable the latter part of May, 1914, in regard to three commodities. While radishes were selling for a week or more at from ten to fifteen cents a dozen bunches, they were quoted at forty cents. Spinach, during the same time, was selling at twenty cents and twenty-five cents a bushel, but was continually quoted at eighty-five cents. Rhubarb sold on the Central Market at twenty-five cents or thirty-five cents a bushel basket, which is approximately thirty-five

pounds, but was quoted at five cents a pound, which would be a dollar and seventy-five cents a bushel basket.

The following tables show a comparison between the prices obtained by growers in the Central Market, the wholesale prices as quoted in the daily papers, and the retail prices in Minneapolis stores on June 29, July 2, and July 3, 1914. The Central Market prices were obtained directly from the growers on each day, and although all growers were not charging identical prices, what seemed to be the prevailing prices were taken. The retail prices were obtained by inquiry at retail stores, where vegetables of the same quality as those considered in the Central Market were selected. In some instances the Central Market and retail prices were obtained on identical lots of vegetables. In the fourth column of these tables are shown the proportions of retail prices received by farmers selling through the Central Market. The simple average for all cases shown below is 63.2 per cent. The difference between the Central Market price and the retail price indicates roughly the gross margin taken by the retailer.

June 29, 1914

	Central Market price	Wholesale quotations	Retail price	Per cent received by producer
Asparagus per dozen bunches	$0.60–0.75	$0.75	$0.96	70.3*
Beets per dozen bunches	.30	.....	.40	75.0
Radishes per dozen bunches	.15	.40	.30	50.0
Carrots per dozen bunches	.25	.50	.60	41.7
Onions per dozen bunches	.25	.40	.40	62.5
Lettuce per dozen heads	.10	.20	.30	33.3
Cabbage per dozen heads	.90–1.00	.90	1.80	52.8*
Cauliflower per dozen heads	1.75	2.00	2.40	72.9
Cucumbers per dozen	.60	.75	.90	66.6
Rhubarb per bushel of approximately 35 pounds	.35	.70	.55	63.3
Peas per bushel	1.75–2.00	2.00	2.60	72.1*
Wax beans per bushel	3.50	3.50	3.75	93.3
Strawberries per 24-quart crate	3.25–3.50	4.00	4.32	78.1*

July 2, 1914

	Central Market price	Wholesale quotations	Retail price	Per cent received by producer
Asparagus per dozen bunches	$0.80	$0.75	$0.96	83.3
Beets per dozen bunches	.25– .30	.....	.60	45.8*
Radishes per dozen bunches	.12- .15	.40	.30	45.0*
Carrots per dozen bunches	.25	.40	.60	41.7
Onions per dozen bunches	.20	.40	.30	66.7
Lettuce per dozen heads	.10	.20	.30	33.3

* The average Central Market price is used in computing this proportion.

July 2, 1914—*Continued*

	Central Market price	Wholesale quotations	Retail price	Per cent received by producer
Cabbage per dozen heads	.60– .75	.90	1.20	56.2*
Cauliflower per dozen heads	1.25–1.50	2.00	1.80	76.4*
Cucumbers per dozen	.50– .60	.75	.90	61.1*
Spinach per bushel	.75–1.00	.60	1.60	54.7*
Rhubarb per bushel of approximately 35 pounds	.30– .35	.70	.55	59.0*
Peas per bushel	1.50	2.00	1.80	83.3
Wax beans per bushel	3.00	3.00	3.75	80.0
Strawberries per 24-quart crate	3.00–3.25	4.00	4.80	65.1*
Currants per 24-quart crate	2.25–2.50	3.00	3.00	79.1*

July 3, 1914

	Central Market price	Wholesale quotations	Retail price	Per cent received by producer
Asparagus per dozen bunches	$0.70–0.80	$1.00	$1.20	62.5*
Beets per dozen bunches	.20– .25	.....	.60	37.5*
Radishes per dozen bunches	.12– .15	.40	.20	67.5*
Carrots per dozen bunches	.25– .30	.40	.60	45.8*
Onions per dozen bunches	.25	.40	.30	83.3
Lettuce per dozen heads	.10	.20	.30	33.3
Cabbage per dozen heads	.75– .80	.90	1.20	64.6*
Cauliflower per dozen heads	1.75–2.25	2.00	2.40	83.3*
Cucumbers per dozen	.60	.75	.90	66.7
Rhubarb per bushel of approximately 35 pounds	.35	.70	.55	63.6
Peas per bushel	1.25–1.50	2.00	1.80	76.4*
Wax beans per bushel	2.75–3.00	3.00	3.75	76.7*
Strawberries per 24-quart crate	3.25	4.00	4.80	67.7

* The average Central Market price is used in computing this proportion.

COÖPERATIVE MARKETING OF GRAIN IN WESTERN CANADA

By L. D. H. Weld

The principal grain-growing provinces of Canada are, from east to west, Manitoba, Saskatchewan, and Alberta. The railroads of these provinces converge at Winnipeg, making it the greatest primary *wheat* market of the world. The receipts of wheat at this city for the year 1912-1913 were 238,000,000 bushels, as compared with 111,000,000 bushels at Minneapolis. Over seventy-five per cent of the wheat that is marketed through Winnipeg is exported; it passes on to Fort William and Port Arthur, located on the northern shore of Lake Superior, forming the Canadian head of the lakes just as Duluth and Superior form the American head of the lakes. To handle the immense business that passes through Winnipeg the grain dealers of that city have long been organized into the Winnipeg Grain Exchange, which is similar in essential respects to the Minneapolis Chamber of Commerce.

The development of the grain trade in Western Canada since 1900 has been attended by practically the same abuses and difficulties that appeared in the American Northwest during the seventies and eighties; there are line elevators, just as in the United States; shippers have found it difficult to get cars; low prices were paid to farmers at country points; complaints of under-weighing and of excessive dockage were frequent. The movement on the part of farmers which led to the organization of local farmers' elevators in Minnesota and other states has taken rather a different form in Canada, and has resulted in the formation of three large coöperative companies, one in each of the provinces. The Grain Growers' Grain Company, with headquarters in Winnipeg, is mainly a terminal-marketing company; the Saskatchewan Coöperative Elevator Company and the Alberta Farmers' Coöperative Elevator Company are primarily centralized organizations of country elevators, although the former also attends to the marketing of grain in Winnipeg. Taken together, these three companies constitute one of the most interesting and remarkable developments of coöperation among farmers in the world.

The agitation among the farmers of Western Canada against the unsatisfactory conditions of the grain trade first took the form of local grain dealers' associations, just as the farmers of the United States had expressed

their indignation through the formation of the Patrons of Husbandry many years before.[1] The first local Grain Dealers' Association was formed in 1901 in Saskatchewan; many others appeared within a few months, and in 1902 the movement spread into Manitoba, where thirty local associations had been organized by the spring of 1903.

To-day there are some two hundred and fifty local grain growers' associations in Manitoba, five hundred in Saskatchewan, and three hundred in Alberta. In Alberta these associations are known as the United Farmers of Alberta, or the "U. F. A." Each province has a central organization, with its executive officers and board of directors, and the central organizations of these three provinces are further federated into the Canadian Council of Agriculture, which is composed of the executives of the provincial organizations, together with the executive of the Dominion Grange, the farmers' organization of Ontario.

The objects of the grain growers' associations are primarily social and legislative. They aim to use their influence for better legislation bearing on the marketing, grading, and transportation of grain, to promote better education among farmers, and to encourage coöperation in the distribution of farm products and in the purchase of supplies. They have achieved such power as to affect profoundly legislation in the provinces, and it is only natural that the movement should have resulted in the formation of vast economic organizations whose main purpose is the coöperative marketing of grain.

The Grain Growers' Grain Company

The Grain Growers' Grain Company, the first of these companies to be formed, really originated in Saskatchewan, where the members of one of the local grain growers' associations conceived the idea of organizing a company which should obtain a seat on the Winnipeg Grain Exchange and act as a commission agent for consignments of grain. The actual organization took place at Sintaluta, Saskatchewan, in December, 1905, with about forty shareholders. In 1906 the Manitoba Grain Growers' Association became interested, and many farmers subscribed for stock. Agents were sent into the country to address meetings of farmers and to solicit stock subscriptions. In July, 1906, the first meeting of shareholders was held in Winnipeg. A seat was purchased in the Winnipeg Grain Exchange for $2,500 and although the company was about $1,700 in debt, a line of credit was secured by the joint signature of many farmers, and the company began business on the fifth of September, 1906.

[1] On this and similar movements cf. S. J. Buck, *The Granger Movement* (Harvard University Press, 1913).

The history of the growth of this farmers' organization since 1906 furnishes one of the most interesting episodes in the history of the grain trade on the American continent. Starting in debt, entering a business in which the leaders had had no experience, meeting in competition the powerful and organized interests that had become established in the terminal market, and beset by difficulties from the very start, the company soon began to prosper, increased its business by leaps and bounds, and within six years had become the largest single handler of grain in the Winnipeg market.

The first and most important obstacle to be overcome was the attitude of the Winnipeg Grain Exchange. In October, 1906, the month after the company started in business, the Grain Growers' Grain Company issued a circular in which it announced its intention of paying a patronage dividend, that is, that after paying a fair rate of dividend to stockholders, it would distribute surplus profits to the shippers of grain in proportion to the amount of grain shipped by each. It was the original intention of the organizers to make the company coöperative in the strictest sense of the word. The one-man-one-vote principle was adopted at the very first, and the amount of stock that any one person could hold was limited. Then the company wanted to adopt the patronage dividend.

It was the proposed adoption of the patronage dividend to which the Winnipeg Exchange objected. The officials of that organization interpreted this method of distributing profits as amounting to the payment of a rebate to shippers, something that was against the rules of the exchange. The Grain Growers' Grain Company was expelled from membership (although the patronage dividend had not actually gone into effect), with the result that no member of the exchange could purchase grain from the company without charging the usual commission, which would of course leave the grain company without any revenue, as it in turn was dependent on the commission charged farmers who consigned grain to it.

The Winnipeg Grain Exchange is not alone in its objection to the patronage dividend; the organized exchanges of Minneapolis and Duluth hold the same view. Its explanation lies in the history of certain questionable practices of grain dealers. In the early days of organized grain trading it was found that lack of uniformity in commissions charged by dealers in terminal markets led to grave abuses. The commission men were and always have been fierce competitors for the grain shipments of farmers and of the elevators owned coöperatively by farmers. They send solicitors into the country who use their influence to obtain consignments. These solicitors have often offered special inducements, sometimes in the form of secret rebates to large individual shippers, and sometimes to the managers of farmers' elevators. In the latter case, the elevator managers would pocket the rebate for personal use.

This state of affairs tended to demoralize the grain trade, resulted in cut-throat competition, encouraged inefficient handling of farmers' consignments of grain at the primary markets, and put a premium on dishonesty, because the commission men were tempted to recoup their losses from rebating by manipulation of price returns. The grain exchanges consequently adopted the so-called "commission rule," fixing the commission to be charged at a certain amount per bushel (one cent in the case of wheat), and forbade the remission of any part of this commission to shippers. There was apparently good and sufficient reason for the adoption of this practice, and it has undoubtedly worked to the advantage of all engaged in the grain trade, including the farmers themselves.

But here comes a farmers' coöperative organization seeking membership in an organized grain exchange, and its method of distributing profits among shippers is interpreted as an infringement of the commission rule. The farmers can see no reason why the organized market place should be closed to them, just because they want to make their association coöperative. The grain exchanges claim that they have no objection to such a company provided it distributes all profits in the form of stock dividends. When the amount of stock that an individual may own is limited, and when the stockholders are also the grain shippers, the distribution of all profits as stock dividends corresponds roughly to the patronage dividend method; but the farmers of Canada wanted complete and thorough coöperation, and the Winnipeg Grain Exchange, prompted undoubtedly by fear of the power that such a farmers' organization might wield, promptly excluded them from membership.

Exclusion from the Winnipeg Grain Exchange was a serious matter for the Grain Growers' Grain Company. There is no market for wheat in or near Winnipeg outside of the exchange. What flour mills there are in Canada have their own lines of elevators and buy direct from farmers in the country. The situation is different in Minneapolis. Most of the wheat that comes to Minneapolis is bought by the flour mills of that city and by the numerous fair-sized country mills within a short distance, and it is therefore possible to sell a certain amount of grain without belonging to the organized exchange.

It was in October, 1906, that the Grain Growers' Grain Company was expelled from the Winnipeg Exchange. The manager went east and succeeded in finding a market for a considerable amount of grain, but it was necessary to belong to the exchange. The grain growers appealed to the Manitoba Government to compel the Winnipeg Grain Exchange to reinstate them, and the influence of the grain growers' associations described above was so great that the Government espoused the cause of the farmers, and took the position that the Grain Growers' Grain Company should not have been expelled. It even threatened to take away the charter of the grain

exchange. The latter, however, insisted that the Grain Growers' Grain Company could be readmitted only on condition that it abandon its intention of dividing profits on a patronage basis. This the grain company finally consented to do, and it was readmitted in April, 1907.

In some ways the fact that the Grain Growers' Grain Company has not been allowed to divide profits on a patronage basis has been a blessing in disguise, because otherwise the company would probably have paid out all its profits as dividends instead of building up a substantial reserve. At first, the profits were generously distributed. The first year there was paid a seven per cent dividend; the second year, a forty per cent; the third, a thirty per cent, the second and third dividends being applied in payment of stock held, and upon which only one call had been made. The original subscribers paid in cash only seven dollars and fifty cents for shares of twenty-five dollars par value; by the end of three years, dividends had paid for these shares in full. The checks representing the seven per cent cash dividend of the first year have been preserved and framed by many of the original members.

After 1909 the policy was changed; fifteen per cent dividends were declared in 1910, and only ten per cent since that time. As a result, a large reserve has been built up, and this has not only served as a source of financial strength, but has enabled the company to enter on various activities which have been beneficial to farmers.

The members of the Winnipeg Grain Exchange viewed with alarm the rapid increase of business of this farmers' company. In 1909 the exchange suspended the commission rule, which it had been so particular to enforce when the Grain Growers' Grain Company was expelled in 1906. The Grain Growers' Grain Company transacts business as a regular commission merchant, taking out one cent a bushel on consigned wheat from farmers. By suspending the commission rule the members of the grain exchange believed that the farmers' company would be hard hit; that it would have to handle wheat at one-half cent per bushel or less in order to get business, and that the company would thereby suffer a loss. The old established grain merchants believed that they could get along on a smaller profit, or no profit at all, until the Grain Growers' Grain Company should be driven from the field.

Confronted by this new difficulty, the officials of the Grain Growers' Grain Company explained the matter to its farmer members, and asked them how much commission it should charge. They told the company to continue to charge the full one-cent commission, and this the Grain Growers' Grain Company did, although the elevator companies and many of the commission merchants charged only one-half a cent and even one-quarter of a cent.

In the United States, one of the principal obstacles to successful co-operation has been the lack of loyalty of members when outside private com-

Type of Country Elevator Owned and Operated by the Grain Growers' Grain Company, Located at Isabella, Manitoba

Terminal Elevator at Fort William Operated by the Grain Growers' Grain Company with a Capacity of 2,500,000 Bushels

panies have offered them a slightly higher price for their products. Note the splendid loyalty of the Canadian farmers in this case. Although they could have got at least one-half cent a bushel more for their grain by shipping to outside commission men, they shipped more than ever to their own company. The Grain Growers' Grain Company handled 7,000,000 bushels of grain the year before the commission rule was suspended; during the year of its suspension it handled 16,000,000 bushels! The Winnipeg Grain Exchange, realizing the futility of this scheme, reëstablished the commission rule the following year.

The rapid growth of the Grain Growers' Grain Company is shown by the following figures which indicate the total amount of grain handled each year since its organization:

	Bushels
Year ending June 30, 1907	2,340,000
Year ending June 30, 1908	4,990,542
Year ending June 30, 1909	7,643,146
Year ending June 30, 1910	16,332,645
Year ending June 30, 1911	18,845,305
Year ending June 30, 1912	27,775,000
Year ending June 30, 1913	29,975,000
Year ending June 30, 1914	29,920,000

The company started in business in 1906 with $25,000 capital subscribed and $5,000 paid up; by 1909 the capital subscribed amounted to $188,950; in 1911 it was $615,000; and on June 30, 1914, the subscribed capital was $1,061,925, of which $771,409 had been paid in.

The balance sheet as of August 31, 1914, shows total assets of $1,531,782, including city real estate, elevators, and stocks of other corporations. Advances on bills of lading and other sums due the company alone amount to $373,500. From its regular commissions and other operations the company earned a net profit of $151,080. Out of this amount ten per cent dividends were paid, amounting to $73,515, and a large part of the remainder was thrown into the reserve, which now totals $215,000.

In 1911 the Grain Growers' Grain Company organized a subsidiary corporation to buy grain and export it to foreign countries. This is a difficult and intricate business, and although the company claims to have reduced the spread between farm prices and export values, thus benefiting the farmers, the company itself met with a huge loss of over $200,000 during the year ending August 1, 1913. The loss was due largely to inexperience, but partly to the fact that some grain spoiled in transit. At any rate, the company was able to meet all its losses on this branch of the business and still emerge with a surplus of nearly $200,000—a most remarkable record for a farmers' organization only six years old. Opponents of the

company have used this loss as an argument that coöperation in grain marketing is a failure. To draw such a conclusion is as fallacious as it would be to argue that private enterprise is a failure in grain marketing because a certain large firm,—well known in the grain trade—suffered a loss running into the millions in a few days not many months ago. The export business of the Grain Growers' Grain Company has been reorganized and is being conducted on a more careful and conservative basis.

The Grain Growers' Grain Company also operates grain elevators, both terminal and country. The Manitoba Government, in response to an agitation among grain growers, purchased 176 country elevators in Manitoba with the idea of ultimate government ownership of all elevators in that province. The Government paid too much for these elevators, and as many of them are poorly located, the Government naturally suffered a loss in trying to operate them.

In 1911 the Grain Growers' Grain Company leased these 176 country elevators from the Manitoba Government at an annual rental of six per cent of the cost of the elevators to the Government. During the first year, these elevators were operated at a loss to the company, although the farmers of Manitoba gained through more adequate shipping facilities. The year ending August 31, 1914, showed a slight profit from these country elevators, and the lease with the Provincial Government has been renewed for 1914-1915.

The company also operates huge terminal elevators at Fort William, leased from the Canadian Pacific Railroad, and having a total capacity of 2,500,000 bushels. During the year 1912-1913, 18,000,000 bushels of grain were handled through these elevators at a large profit. The company also owns a well-equipped elevator with cleaning equipment at Fort William, and a small elevator at Vancouver, British Columbia, through which it intends to enter the Pacific business.

This company is more than a grain-marketing concern, however. It acts as an agency through which supplies are sold to the farmers of Western Canada in carload lots. It distributes coal at a saving of from two to three dollars a ton; it distributes apples in car lots direct from the fruit growers' associations of Ontario; it sells flour, and has even been experimenting in the operation of a small flour mill from which it ships direct to local grain growers' associations; it has also bought a huge timber tract in Western Canada, where it intends to erect saw mills, from which lumber will be distributed at cost. It is in such enterprises as this that it intends to invest capital subscribed in the future.

The company has been rapidly adding other commodities which are handled in this way, and the following statement indicates the quantities of such commodities handled during the year ended August 31, 1914:

Commodity	Date when first handled	Quantity
Coal	October, 1913	8,926 tons
Apples	October, 1913	5,336 barrels
Lumber	March, 1914	89 carloads
Fence posts	March, 1914	60 carloads
Flour	.....	213 carloads
Woven fence wire	April, 1914	190,280 rods
Barbed wire	April, 1914	8,581 rolls of 80 rods
Binder twine	.....	2,395,400 pounds

The company estimates that it has saved the farmers of Western Canada $60,000 on binder twine alone.

In addition to these various activities the company through a subsidiary corporation owns a well-equipped printing establishment in Winnipeg and publishes its own paper, the Grain Growers' Guide, which has a larger circulation than any other farm paper in Western Canada, and which acts as the official organ not only of the Grain Growers' Grain Company but also of the powerful Grain Growers' Associations. The printing plant also does a large commercial printing business.

To handle this immense business with its many ramifications the company has offices in Winnipeg, Fort William, Calgary, and Vancouver. There are over 350 employees during the busy part of the year.

Although there is perhaps some danger that this great company may "grow away" from the farmers of Western Canada, it is apparent that it is being operated solely in their interests, and that the farmer members are enthusiastic and loyal. It has been of incalculable benefit to them, through reducing the spread between farm prices and Winnipeg prices; through savings effected by supplying commodities to farmers at cost; and through tending to make Canadian farmers more business-like and independent. The company is managed conservatively, and there is every prospect of its continued and successful existence.

The Saskatchewan Coöperative Elevator Company

The movement which led to government purchase and operation of country elevators in Manitoba resulted in the appointment of a commission in Saskatchewan to study the grain situation and to report on the feasibility of government ownership of elevators.

In the United States we are not accustomed to expect much from such commissions. With us political preferment usually plays a part in their appointment, and their recommendations are not likely to be followed by the legislature. But the Saskatchewan commission was appointed for the purpose of actually accomplishing something. It consisted of three commissioners—a member of the provincial legislature, a college professor, and

the secretary of the Saskatchewan Grain Growers' Association. Hearings were held at sixteen different places in the province, and an impartial and convincing report was made. This was in the fall of 1910.

The report of the Saskatchewan Elevator Commission [2] advised strongly against government ownership and operation of country elevators, on the ground that such a scheme would probably not be satisfactory to the farmers, and that it would undoubtedly end in financial disaster. The commission presented an alternative plan—a system of farmers' coöperative elevators, to be built largely by government loans, but managed by the farmers themselves through a central organization. It was pointed out that a direct pecuniary interest on the part of the farmer was needed to make the elevators a success in competing with the established line elevators.

Saskatchewan already had a few farmers' elevators. There had been nine established before 1900, but the number had increased slowly. An impetus had been given to the movement in 1906, and by 1910 there were twenty-nine in the Province. The Elevator Commission studied these elevators carefully, and found that many failures had occurred among them. The reasons for such failures it asserted were, first, poor management (insufficient paid-up capital, inefficient managers, liberality with respect to dockage, and undue interference on the part of directors and shareholders); and, second, competition of elevator companies, new railroad lines, and loading platforms. The commission decided, however, that as a class the farmers' elevators had been successful. These had, of course, been built by local groups of farmers on their own initiative without public aid and without centralized management, just as farmers' elevators have been built in the United States.

The report of the commission met with universal favor and the Saskatchewan Coöperative Elevator Company Act was passed by the legislature on March 14, 1911, about four months after the commission made its report. The most important provisions of this act [3] are as follows: shares of fifty dollars each, to be held only by agriculturists; no person to hold more than ten shares; local associations to be formed by stockholders to build elevators at country points with the proviso that there should be 2,000 acres under cultivation for each 10,000 bushels of elevator capacity; at least fifteen per cent of the par value of stocks to be paid by subscribers, and the remaining eighty-five per cent of the money necessary to build the elevators to be loaned by the government; this government loan to be repaid in twenty equal annual installments including interest; the company to be managed by a board of directors elected by shareholders, each

[2] This was published as *Report of the Elevator Commission of the Province of Saskatchewan*, 1910, Regina: John A. Reid, Government Printer.

[3] The full text of this act, together with an explanation of its provisions and also by-laws of the company, was published as Pamphlet No. 1, by the Saskatchewan Coöperative Elevator Company, Ltd., Regina.

member to have but one vote. The rate of interest on the government loan is only five per cent. Dividends on stock are limited to six per cent; adequate provision is made for the accumulation of a reserve, and for the distribution of profits on a patronage basis.

No time was lost by the farmers of Saskatchewan in availing themselves of the advantages offered by this interesting legislation. The Saskatchewan Coöperative Elevator Company was permanently organized on July 6, 1911. Plans and specifications for elevators were soon adopted. Contracts were let for the building of forty elevators to be completed at various dates from October 1 to November 15 of that same year. Things move rapidly in Western Canada. Six other elevators were purchased by December and grain began to be handled as soon as elevators were completed or bought. In other words, the company was actively engaged in the grain business within six months after the act of incorporation was passed by the Provincial Legislature, and within two months after permanent organization of the company had been perfected. Arrangements were made with one of the leading banks of Canada whereby a line of credit of half a million dollars was made available for the purchase of grain.

An agreement was entered into with the Grain Growers' Grain Company of Winnipeg, whereby that firm became the selling agent for the company's grain for the first season, and "the wisdom of the arrangement," as the board of directors said in their first annual report, "has been proved by the satisfactory working of it."[4] Under this management the Grain Growers' Grain Company handled the grain of the Saskatchewan Company for one-half cent per bushel commission. In order to make this possible the Saskatchewan Company took out a membership in the Winnipeg Grain Exchange, whose rules allow one member to handle grain for another member at one-half cent commission. In June, 1912, however, the board of directors decided that "the growth of the business demanded that the work of selling the company's grain should not in future be entrusted to agents, however competent and trustworthy," and the necessary steps were taken to organize a sales and commission department in Winnipeg, which should sell grain directly on the floor of the Grain Exchange. Thus in addition to the Grain Growers' Grain Company, there is now another immense farmers' organization marketing grain in Winnipeg. By the end of the first year, 8,962 farmers had subscribed for $1,177,200 worth of stock; in 1913 the number of subscribers had increased to 13,156, and the subscribed capital to $1,818,000. During the first year, forty elevators were operated; during the second year, 137; and in the fall of 1913 there were 192 elevators

[4] Annual reports have been published for general distribution by the Saskatchewan Coöperative Elevator Company, Ltd., Regina, and condensed reports have appeared in the *Grain Growers' Guide*.

in operation, which also means that there were 192 local organizations of farmers belonging to the central organization.

The phenomenal growth of the Saskatchewan company is indicated more clearly by the increase in the volume of business. During the first year it handled 3,261,000 bushels of grain; during the second year it handled 12,900,000 bushels. About one third of this was bought outright by the company, and the remainder was "special binned," for farmers, meaning that the grain was stored in small compartments in the elevators and that the identity of the grain of each individual shipper was maintained. This is an interesting feature of the grain business in Canada. Farmers like to store their grain rather than sell it to the elevator company; they want their grain kept separate and then ship a carload at a time to the primary market. Such shipments are handled on consignment by the sales agent of the central organization on the Winnipeg Exchange.

At the end of the second year of operation the company had a clear profit of $167,926. After the payment of dividends to shareholders, an amount representing three dollars per share was applied to increase the paid-up capital of all shareholders. The remainder was thrown into reserves. The balance sheet showed total assets of $1,709,000, of which $1,290,000 represented the value of country elevators. The loan from the Saskatchewan Government to the company stood at $1,206,000 on July 2, 1913.

The growth of the company is also strikingly illustrated by the rapid increase in the number of employees. It started its organization work in 1911 with an office staff of one. On July 31, 1913, there were 310 persons in the operating department, 63 at the head office, 22 in the Winnipeg office, and 145 in the construction department, making a total of 540. The company has naturally had difficulty in finding and developing efficient managers. That it has been able to expand its organization so rapidly as to handle its immense volume of business efficiently is a monument to the ability of the farmer of Western Canada.

The Alberta Farmers' Coöperative Elevator Company

After the foregoing description of the Saskatchewan Coöperative Elevator Company, it is needless to enter into the details of the movement as it has developed in Alberta. The farmers of that province were suffering from monopoly control of the few elevators already in existence, and they were in great need of more elevators. The United Farmers of Alberta, corresponding to the Grain Growers' Associations of Manitoba and Saskatchewan, were responsible for the agitation, and the Provincial Government did not hesitate to do its part. The movement began a little later in this province; the Manitoba experience had demonstrated the futility of government ownership and operation of country elevators, and Alberta

naturally followed the example of Saskatchewan, whose experiment in government loans to coöperative elevators had started out so auspiciously.

The act providing for the incorporation of the Alberta Farmers' Cooperative Elevator Company, Limited, was passed by the Alberta legislature in January, 1913, without a dissenting vote. The provisions are similar to those of the Saskatchewan act. The government makes loans to local associations of farmers up to eighty-five per cent of the cost of the elevators, to be repaid in twenty annual installments with interest at five per cent. Less power is reposed in the central organization, and more in the local elevator associations. The shares are sixty dollars each, and the stock dividends are to be at the rate of eight per cent.

That the passage of this law was welcomed by the farmers of Alberta is evident from the fact that within eight months of its passage, fifty elevators had been built and were open for business in time to handle the 1913 crop. By the summer of 1914 there were in the neighborhood of sixty-five elevators. During the season 1913-1914 there were marketed nearly 4,000,000 bushels of grain, at a profit to the company of $14,000. The grain is handled in Winnipeg by the Grain Growers' Grain Company, which also finances the elevators in their purchases and shipments.

The president of the company in his last annual report said: "We have demonstrated the power of coöperation. At points where no coöperative elevators were operating we have been shown what treatment the Alberta farmers would have received had our company not been in existence. We have farmers who have drawn their grain twenty to thirty miles to our elevator rather than sell to those close at home." [5]

The Alberta Company has recently organized a live-stock department which between July 1 and October 1, 1914, marketed 180 cars of hogs, saving the farmers from one-fourth to one-half cent a pound. The company is definitely planning to have its own packing plant when the number of hogs handled reaches 50,000 a year.

Conclusion

The history of these three Canadian companies furnishes many interesting lessons for farmers of the American Northwest. Most of the farmers' organizations of the United States are independent and unfederated units. The California Fruit Growers' Exchange is perhaps the only organization in this country that can compare with these Canadian companies in number of members and volume of business handled. The power of

[5] Information on this company was obtained from the annual reports as they appeared in the *Grain Growers' Guide*. The law providing for the incorporation of this company has been published separately. Chapter 13, 1913, J. W. Jeffery, Government Printer, Edmonton, Alberta. The headquarters of the company are at Calgary.

united effort on a large scale is perhaps the most conspicuous object lesson that the Canadian experience offers.

The business success of Canadian farmers has had a beneficial effect in tempering and rationalizing their attitude toward commercial organization and methods in general and toward the operations of grain exchanges in particular. When the Grain Growers' Grain Company was first organized, the leaders of the movement held the most exaggerated notions about the practices of grain exchanges and the evil influences of future trading. To-day, these same men are transacting their business in the "pit" of the Winnipeg Grain Exchange, and they are buying and selling options to protect their transactions. They have come to view the matter from a different standpoint, and the education that they have received is resulting in a more rational and conservative attitude among Canadian farmers in general. It should also be borne in mind in connection with the development of these companies, that they did not spring up from a mass of previously unorganized farmers. Rather, they have as a background, the powerful and well-organized Grain Growers' Associations of Manitoba and Saskatchewan, and the United Farmers of Alberta. Such vast and successful economic organizations as those described above would perhaps have been impossible if the farmers had not already been organized for social and political purposes.

THE FOOD SUPPLY OF THE IRON RANGE

By L. D. H. Weld

As a general rule, the residents of Minnesota towns and villages have an advantage over people living in the Twin Cities or Duluth with respect to the prices which they have to pay for products of Minnesota farms. Such products are sold by farmers either to village people directly or through the country store. For farm products which have to be brought to Minnesota from other parts of the country, on the other hand, the larger cities have a slight advantage, in that such products are brought in car lots first to such distributing centers as Minneapolis and St. Paul and then shipped out in small lots to the villages of the State.

The Iron Range[1] in Northern Minnesota, however, is disadvantageously situated with respect to both Minnesota-grown products, and products that have to be shipped in from other parts of the country. In this section of the State there are numerous towns and villages much nearer each other than towns in other parts of the State, and altogether they constitute a fairly large consuming population. But the towns are located as they are, not because they are the centers of farming communities, as in other parts of the State, but because of the proximity of the iron-ore mines, which furnish employment for thousands of men. In fact agricultural development is only beginning in the Range country. It must be added, however, that the inhabitants of this section of the State, and the railroads which own lands, realize that its future prosperity and growth depend largely on the development of agriculture and they are doing their utmost to settle the country with farmers.

Largely because of this backwardness of agriculture the problem of supplying the Range with food products is a difficult one. Not only this, but the Range country is situated in the most northern part of the United States at a considerable distance from the food-producing regions. The population, though fairly large, is not sufficiently concentrated to allow the shipment of food products in carload lots (although this is developing in a small way) and consequently goods are brought in in comparatively small amounts, and at relatively high local freight and express rates. No wholesale grocery or produce house has yet been established in any of the Range towns.

[1] In this paper the term "Iron Range" means the Mesabi Range. The information was obtained in Virginia, Hibbing, and Eveleth.

In general, the range towns are supplied with foodstuffs by Duluth wholesalers although some Twin City and Chicago houses send salesmen into the region. This dominance of Duluth as a supply depot is especially true of general groceries, and to a great extent of perishable products, although the latter are also brought in considerable quantities direct from producing points in Northern and Eastern Minnesota. Even butter comes largely from Duluth centralizers and packers, although there are many instances of direct shipment from country creameries to retail stores. There is practically no butter made on the Range except a small amount in Hibbing. However, the creamery at that point does not make enough to supply its own local trade, and has to ship in butter that is made in another creamery farther South, but owned and operated by the Hibbing company. Butter is handled by the stores largely in prints, but considerable quantities are sold in jars and in bulk. Very little farm-made butter is brought to the stores and existing conditions furnish an opportunity as yet unused for other creameries in Eastern and Northern Minnesota to develop a direct trade with the stores on the Range.

Eggs are bought largely from Duluth wholesalers, but considerable quantities are also obtained directly from country stores and small local dealers in Northern Minnesota, especially along the lines of the Great Northern Railroad. This direct purchase is apparently not increasing. Some Range stores have even had to give it up because of the irregularity and uncertainty of receipts during the greater part of the year, and because of unreliability in quality. The result is that the eggs sold on the Range are reputed to be of inferior quality. Poultry is also obtained partly from Duluth, but largely from dealers and storekeepers in Northern Minnesota who ship chickens alive by express.

Potatoes are the only food product which is supplied largely by farmers living in close proximity to the Range towns. Farmers haul them directly to the stores in many of the towns, where they receive in exchange either cash or trade. The local supply of potatoes is not sufficient for the local demand, however, and they are bought to some extent of Duluth wholesalers, and also from dealers in other parts of the State. An interesting development is the bringing-in of carloads of such commodities as potatoes, cabbage, apples, etc., to be sold directly to retailers. A grower, or a dealer who buys up a carload in Wisconsin or in the Twin Cities, sends it to one of the more important towns on the Range. He accompanies the car and goes around from store to store to sell out his carload. Sometimes retailers buy on the description of such a carload seller, and sometimes they inspect the goods in the car; at any rate the retailers send their own teams to the cars to haul their purchases away. This method suggests the possible development of a wholesale produce business in the near future.

The milk problem is a difficult one, and since practically all the milk used in the larger towns has to be shipped in, the price is high. In October, 1914, milk was selling at ten cents in Virginia and Hibbing, whereas the Twin City price was eight cents. Dairying has begun to develop and there are a few fine dairy farms near some of the principal towns and when milk is shipped in it comes from no very great distance, although some is obtained from points about fifty miles away. A somewhat unusual feature of the milk and cream trade in Virginia is the demand on the part of some of the Hebrew population for sour cream. Sometimes a dealer in that city purposely allows his cream to sour in order to have a supply on hand.

Meats are supplied to the Range towns from the packers' distributing houses in Duluth. The prices of meat, as shown below, are much higher than in the Twin Cities, and there is very serious complaint about the quality of the meat carried by the local butchers. The feeling is so strong in Virginia that there is a movement on foot to establish a coöperative meat market. One interesting feature of meat prices on the Range is that whereas the price of porterhouse steak is lower than in the Twin Cities, the price of sirloin is about the same, and the price of round much higher. In other words, the Twin City prices are differentiated more in respect to the different cuts than are the Range prices. Apparently "meat is meat" on the Range; the discriminating demand for really choice cuts is relatively slight.

AVERAGE RETAIL PRICES OF CERTAIN COMMODITIES IN IRON RANGE TOWNS, AND IN TWIN CITIES, OCTOBER 22, 1914

COMMODITY	UNIT OF MEASURE	AVERAGE PRICES		RATIO RANGE PRICE TO TWIN CITY PRICE
		Range Towns	Twin Cities	
		Cents	Cents	
Butter	Pound	36.6	37.1	98.7
Eggs	Dozen	30.4	33.3	91.2
Potatoes	Bushel	81.3	65.6	123.9
Potatoes	Peck	23.1	16.7	138.3
Sugar	Pound	7.7	7.1	108.4
Spring chicken	Pound	20.6	18.3	112.6
Stewing fowl	Pound	19.6	17.7	110.7
Porterhouse steak	Pound	31.4	33.3	94.3
Sirloin steak	Pound	27.4	26.3	104.2
Round steak	Pound	24.4	21.7	112.4
Rib roast (untrimmed)	Pound	22.2	23.3	95.3
Leg of lamb	Pound	24.4	18.3	133.3
Pork loin	Pound	20.8	19.3	107.7
Pork chops	Pound	22.0	20.0	110.0
Milk	Quart	10.0	8.0	125.0
Average				111.0

The table above gives a comparison made on October 22, 1914, between Range prices and Twin City retail prices for a number of important com-

modities. Prices were obtained on this date in ten retail stores located in Hibbing, Virginia, and Eveleth, and also in ten stores located in Minneapolis and St. Paul. These were then averaged for each commodity, and the last column in the table shows what per cent the Range price is of the Twin City price in each case.

The average in the last line is an unweighted one, and can be interpreted only as an indication that the Range prices on these commodities average about ten or eleven per cent higher than Twin City prices. Whether these higher prices constitute a proportionately heavier burden on the inhabitants of the Range can not be definitely determined without making a comparison of relative incomes, but it is safe to conclude that one's earning capacity must be greater on the Range than in the Twin Cities in order to enable him to maintain the same standard of living. It is also safe to conclude that in times of business depression, such as have affected the Range towns during 1914, the higher cost of living becomes relatively more important.

The high prices on the Range and the consequent discontent have led to a number of interesting attempts on the part of consumers to reduce the cost of living, mainly by means of coöperative stores. There are at least a dozen coöperative stores in the different towns, and they have been organized principally among the Finnish people, who constitute a large proportion of the population. The Finns undoubtedly brought their tendency to coöperate from Finland, where since 1900 there has been a very rapid and spectacular development of various kinds of coöperation. One unique feature of the Finnish coöperative stores on the Range is that of the 120 or so coöperative stores in Minnesota, practically all outside the Range area have been organized among farmers, whereas these on the Range are primarily among work people of the towns.

One of the largest of these coöperative stores is the Virginia Work People's Trading Company. It was organized in 1909 and has 225 stockholders. The par value of stock is ten dollars. About $6,000 of capital has been paid in, and during the year ended December 31, 1913, the store did a gross business of $80,000. Six per cent stock dividends and three per cent trade dividends are paid, the latter in stock, however, and not in cash. When the trade dividend amounts to less than ten dollars the customer has the privilege of paying the remainder in cash in order to get a share of stock, or of letting it stand to his credit until enough has accumulated to pay for the issue of a share.

The store appears to be managed conservatively and now has a surplus of about $3,000. The company owns property in Virginia worth about $10,000, all of which, except $1,500, has been paid for. When a member moves away, the company redeems his stock. The store is neat in appearance and carries a good stock worth about $10,000. It takes orders by telephone and

delivers once a day to all parts of the city. The significance of the number and importance of these enterprises is shown by a movement now on foot to effect the organization of a league of Finnish coöperative stores.

High prices have also led to a most interesting marketing experiment in the shape of a public market at Eveleth, a city which had 7,000 inhabitants in 1910. This was started by the city during the summer of 1914 at a cost of about $10,000. The plant consists of a market house, a barn, and sheds. There are a good many farmers located near the city, and the market master claims that some haul their goods from points twenty-five or thirty miles distant. The number of farmers coming to market on any one day is not large.

Farmers may stay at the market and sell their own products, or they may leave them in charge of the market master, who sells them without charging any commission. More common, however, than either of these methods is the outright purchase of the commodities from the farmers by the market master. The master is governed by Duluth wholesale prices in his purchases, and he sells the commodities to consumers in any quantity desired at practically the same price which he pays. In other words, he does not even allow a margin to cover the cost of operating the market. Goods are sold by the market master to city consumers who are allowed to buy as little as five cents' worth at a time. Everything is sold by weight. Customers must bring baskets or bags in which to pack their purchases. The volume of business is not great, but during the afternoon on which the writer visited the market, there was a fairly steady stream of purchasers.

This market not only handles commodities brought in by farmers, but it ships in butter and eggs, and also fish from outside points. These commodities are sold at practically what they cost the market delivered at Eveleth. On October 22, 1914, white fish was selling for nine cents per pound while the stores were charging eighteen cents; lake trout for twelve cents while the stores were charging twenty cents.

Although this market was undoubtedly selling goods at much lower prices than the stores, its method of doing business had aroused bitter opposition among the storekeepers of the city. Under the present system, the city itself is not only engaging in the mercantile business in competition with private individuals, but it is doing business at much less than cost and taxing the inhabitants to pay the expenses of the market. This is of course the wrong principle for a public market to follow, and the merchants have a legitimate grievance. All that a public market may wisely do is to provide a market place with suitable facilities and charge fees for the use of such facilities to cover the cost of maintenance and operation. It is not the city's function to buy or sell merchandise handled by the retail stores, or to set the prices at which such merchandise shall be sold.

The University of Minnesota

STUDIES IN THE SOCIAL SCIENCES NUMBER 6

INDIAN-WHITE AMALGAMATION

AN ANTHROPOMETRIC STUDY

BY

ALBERT ERNEST JENKS, Ph.D.

Professor of Anthropology in the University of Minnesota

MINNEAPOLIS
Bulletin of the University of Minnesota
March 1916

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PREFACE

The Congress of the United States passed an act June 21, 1906, amended March 1, 1907, authorizing mixed-blood Indians on White Earth Reservation, Minnesota, to sell the lands which the Government had previously allotted to them. Many Indians enrolled on that reservation have, as mixed-bloods, sold all or part of their allotments since the passage of the act.

In time the Government suspected that in the sale of certain lands fraud had been committed intentionally by the original purchaser or seller, or both. Through its Department of Justice the Government in August, 1910, began to bring suits against the present owners of more than 1300 pieces of such land,—whether or not the present owners were the original purchasers.

Both the Government and the defendants in these suits spent much time trying to ascertain the facts as to the blood status of the original Indians who sold as mixed-bloods. The method followed was to take Indian testimony, wherever available, covering the physical appearance, geneologies, and family reputation as to geneologies and blood status of the original sellers. It was soon discovered that information so gathered was not very trustworthy.

The defendants then sought to determine the blood status by anthropometric methods. In October, 1914, the writer was called upon for an opinion by Mr. R. J. Powell, attorney for the defendants. I first visited Indians on the White Earth Reservation near the end of November, 1914. The holiday recess of 1914-1915 was spent among the Bois Fort Indians at Pelican Lake and Nett Lake Reservation, Minnesota. Much of the summer of 1915, and all of the first semester of the academic year of 1915-1916 have been given to the studies in hand. In this investigation I have visited, besides those bands of Indians already named, bands on the following reservations: Red Lake, Mille Lacs, Cass Lake, Leech Lake, Lake Winnibegoshish, and Bowstring Lake,—all in Minnesota, and most of which have been visited several times. Turtle Mountain Reservation, North Dakota, was also visited. All individuals studied were measured as to head breadth and length, face breadth and height, nasal breadth and length, color of eye, skin and hair, texture and quantity of hair, and nature of incisors. Detailed examination of the hair could not be made in the field. It is being prosecuted at the present time.

The accompanying paper embodies the first published results of this study in an effort to determine the blood status of certain persons whose

ancestry is in question in the government suits. Only two of the several measurements made are presented in this paper, namely, that of breadth of face as measured from side to side through the zygomatic arches, and that of breadth of head as measured from side to side through the widest diameter of the parietals. In particular a relationship between these two measurements is presented; it is named the "face-breadth head-breadth index." This index is obtained by multiplying the actual breadth of the face in millimeters by one hundred, and dividing the product by the actual breadth of the head in millimeters.

ALBERT ERNEST JENKS

January 22, 1916.

INDIAN-WHITE AMALGAMATION

Among the hereditary physical factors of Indians and whites which are inherited in the mixed-blood offspring of the two peoples are the following: skin color; eye color; hair color and texture; percentage of hairiness of the body, including beard growth; shape of the incisors; length and breadth of nose, and form of the nasal orifices; length, breadth, and height of the head, and also of the face. These are modified independently probably, and some of them probably in relation to one another.

In the present paper attention is called to a factor so constantly modified that it appears to be fully as determinative as any of the above. It is the relation of the breadth of the face to the breadth of the head, which will be called the face-breadth head-breadth index.

FACE BREADTH

Even casual observers have noticed the broad face of the Indian; no popular description of the Indian is complete without a mention of his "high cheek bones." Studies of physical measurements of the Indians have recorded the broad faces of many tribes of American aborigines, such as the studies of Boas,[1] Starr,[2] Hrdlička,[3] and others. Boas called attention to the relatively broader faces of the pure-blood Indians than of the mixed-bloods, and of the relatively broader faces of the mixed-bloods than of the whites, but the relation of breadth of face to breadth of head was not mentioned. Among 3018 pure-blood Indian men, Boas found the narrowest face was 132 millimeters. Whereas he found among 217 white men faces as narrow as 120 millimeters, and among 594 mixed-bloods the narrowest face was 126 millimeters, or about midway between the measurement of the narrowest Indian and the narrowest white. Again, among his 3018 pure-blood Indians he found faces 169 millimeters broad, but among the 217 white men he found none broader than 163 millimeters; among the 594 mixed-blood men were faces 165 millimeters broad. Boas' frequency curve shows the "typical" pure-blood Indian has a facial breadth of from 150 to 151 millimeters. The typical mixed-blood Indian has a facial breadth of from 148 to 149 millimeters, with a much larger secondary type ranging from 143 to 145 millimeters. His "typical" white man has a facial breadth of 140 to 141 millimeters. Thus the

[1] Franz Boas, "Zur Anthropologie der nord-amerikanischen Indianer," in *Zeitschrift für Ethnologie*, 1895, pp. 366-411.

[2] Frederick Starr, "Physical Characters of Indians of Southern Mexico," in *Decennial Publications of the University of Chicago*, 1st series, 4:51-109 (1903).

[3] Aleš Hrdlička, "Physiological and Medical Observations among the Indians of Southern United States and Northern Mexico," as *Bulletin 34, Bureau of American Ethnology*, 1908.

relative breadth of face of the pure-blood Indian, pure-blood white, and Indian-white mixed-blood was clearly noted and demonstrated by Boas in 1895. His complete table of data follows:

TABLE I

FACE BREADTH OF MEN, FROM BOAS[4]

Millimeters	3018 Indians	594 mixed-bloods	217 whites
	per cent	per cent	per cent
120-121	....	....	0.3
122-123	....	....	0.5
124-125	....	....	0.6
126-127	....	0.2	0.5
128-129	....	....	0.8
130-131	....	0.3	3.2
132-133	0.1	1.5	4.0
134-135	0.3	1.3	4.9
136-137	1.0	3.4	10.3
138-139	1.6	6.7	10.3
140-141	3.4	9.6	15.6
142-143	6.1	12.6	14.1
144-145	8.9	12.8	10.0
146-147	12.8	11.6	10.8
148-149	13.7	14.1	6.3
150-151	15.1	10.6	2.5
152-153	12.0	8.2	1.2
154-155	9.1	2.9	1.4
156-157	7.0	1.7	0.5
158-159	4.6	1.7	0.5
160-161	2.3	0.3	0.6
162-163	1.0	0.2	0.3
164-165	0.6	0.2	....
166-167	0.1	....	....
168-169	0.1	....	....

HISTORICAL SKETCH OF AMALGAMATION

During the past year I have examined some more than three hundred Ojibwa Indians, mainly in Minnesota, in a deliberate effort to ascertain whether the different individuals are pure-blood Indians, or mixed-bloods—as, Indian-white, Indian-negro, or Indian-negro-white mixed-bloods. It was soon discovered that the pure-blood Indian type was noticeable chiefly by its absence. Let me suggest the historical foundation for such a condition. Mr. W. W. Warren in his excellent study of his own people (Warren was a mixed-blood Ojibwa) tells us that the Ojibwa Indians first became acquainted with the white man about the

[4] Table XVII, p. 405 of "Zur Anthropologie der nord-amerikanischen Indianer," in *Zeitschrift für Ethnologie*, 1895, pp. 366-411.

Photo by Jenks

Izola Warren (Mrs. George Wah-we-ay-cumig) on the left;
her mother on the right

year 1612.[5] In 1618 Stephen Brulé, one of Champlain's reckless and enterprising voyageurs, brought to Quebec a description of Lake Superior, as well as a specimen of native copper.[6] In 1634, Jean Nicolet became acquainted with the Ojibwa near Sault Ste. Marie. In a letter dated Quebec, September 21, 1654, Father Le Mercier speaks of a flotilla of canoes loaded with furs guided by French traders but manned by Indians from four hundred leagues to the west. From the year 1660, largely due to the explorations and trading successes of the two Frenchmen, Radisson and Groseilliers, the Lake Superior Ojibwa have been exploited for their rich catches of fur. No anthropologist making a first-hand study of the Ojibwa Indians to-day will long doubt that from the date last mentioned, or for the past two hundred and fifty years, the amalgamation of the Indians and whites has been continuous and cumulative in the Lake Superior region. In 1670, the Hudson's Bay Company was organized and for two hundred years dominated the upper Ojibwa area. It early entered the field of the Minnesota Ojibwa with its force of hardy French and Scotch traders. In 1787, the Northwest Company of Montreal was formed. The American Trading Company was started in 1809. The thousands of traders from the above large companies, and many others from smaller and from private trading organizations, were stationed in or roamed over the lands of the Lake Superior Indians. To-day their lineal descendents are traders in or near every Indian village throughout that extensive lake area. It was the rare and exceptional trader who did not have at least one Indian wife.

THE WARREN FAMILY

Let us briefly review the amalgamation process as illustrated in the famous Warren family which to-day has descendents well scattered over the reservations of the Lake Superior region, as well as some who are successful professional men in the largest cities of our Northwest. Richard Warren was a "Mayflower" pilgrim from Great Britain in 1620. A descendent, Abraham Warren, born in 1747, was the father of Lyman Warren, born in Hartford, Connecticut, 1771. Lyman Warren's son, Lyman Marquis Warren, born in 1794, came to Lake Superior in 1818. In 1821, Lyman Marquis Warren married Mary Cadotte, who was said at that time to be three-fourths Indian. The Cadotte family is descended from M. Cadeau, who is said to have come to the Ojibwa country in 1671 in the train of the French envoy, Simon-Francis Daumont, Sieur de St. Lusson. The son of this original Cadeau (without doubt by an Ojibwa woman) was John Baptiste Cadotte. This John Baptiste Cadotte married

[5] W. W. Warren, *History of the Ojibways, Based upon Tradition and Oral Statements*, as Volume V of *Minnesota Historical Society Collections*, 90.

[6] *Op. cit.*, pp. 399-400.

an Ojibwa woman named A-waus-e-clan. They had two children named John Baptiste, Jr., and Michel. Both of these Cadotte brothers married Ojibwa women,—Michel Cadotte being the father of Mary, who in 1821 became the wife of Lyman Marquis Warren. To this couple six children were born who reached maturity, among them being William Whipple Warren, born in 1825, the author of the study, *History of the Ojibways*, (see footnote, page 3). He was a member of the Minnesota legislature in 1851, and died in 1853 at the early age of 28 years. In 1842 William Whipple Warren married Mary Matilda Aitkin, the daughter of the well-known white Indian trader William A. Aitkin and an Indian wife. Two children who reached maturity and married were born to Mr. and Mrs. William Whipple Warren. They were William Tyler Warren and Mrs. Madaline Uran, both of whom lived on White Earth Reservation. A daughter of William Tyler Warren by Nay-nah-cah-wub-e-quay, a woman of some white blood, was born in 1897. She is Izola, shown on the left in plate A with her mother. This picture was taken at their home at Twin Lakes on the White Earth Reservation, Mahnomen County, Minnesota, July, 1915. Izola is about one-half white. In the early autumn of 1915 she was married to George Wah-we-ay-cumig, the son of Chief Wah-we-ay-cumig of the Elbow Lake band, also on White Earth Reservation. The mother of George Wah-we-ay-cumig shows unquestionable evidence of having white blood. George is probably about one-thirty-second white, so that the children which may be born to Mr. and Mrs. George Wah-we-ay-cumig will be about one-fourth white and three-fourths Ojibwa. Some other branches of the Warren family have bred out practically white. Some such members have left the reservations and after graduating from colleges and universities are successfully competing with other white men in high-grade professional work. Still other branches of the Warren family have bred into the Bonga family,—an extensive old Indian family with negro blood, only two members of the third generation of which are still living. Members of the fourth and fifth (and possibly the sixth) generation are numerous and scattered widely over Lake Superior reservations.

The Warren family was selected to illustrate Ojibwa-white amalgamation only because it was typical, and was historically well known. A score of other families might have been presented, some of which are equally well attested by historical data and many of which, like the Fairbanks and Beaulieu families, are probably more widely scattered.

FRENCH AND SCOTCH MIXED-BLOOD FAMILIES

The following lists of French and Scotch mixed-blood families on the White Earth Reservation are taken as typical of many others. They were printed by the United States Government in 1911, when it listed by

name the 3357 Indians enrolled on that reservation. It will be noted that each list is taken from a single initial letter of the alphabet:

TABLE II

CERTAIN MIXED-BLOOD FAMILIES ON WHITE EARTH RESERVATION

French Patronymic		*Scotch Patronymic*	
Beauchamp	Bondreau	McArthur	McNiff
Beaudreau	Boucher	McCauley	Mason
Beaulieu	Branchaud	McDonald	Mayhew
Beaupre	Brisbois	McDonnell	Merrell
Bellanger	Brunette	McDougall	Melvin
Bellecourt		McGillis	Miller
Bellefeuille		McIntosh	Monroe
Benoist		McKeig	Moore
Bibeau		McKenzie	Morrison
Bisson		McLean	Mudgett
Bottineau		McMartin	Murray

With scarcely an exception the names listed above represent old and established families having collateral branches. Intermarriages among the various families have been so extensive that it is believed there is no mixed-blood family of three generations of adults on the White Earth Reservation which is not enmeshed by kinship with ninety per cent of the other mixed-blood families of equal or greater age.

PHYSICAL CHARACTERISTICS OF PURE-BLOOD INDIANS

In order to ascertain whether the different individuals on White Earth Reservation are pure-blood Indians or Indians of mixed blood it was desirable to establish the pure-blood Indian type, and also the pure-blood white types which have largely been the source of the white blood in the mixed families. The American Indian type is well known to scientific students of primitive people. The patent physical characteristics are as follows:

Skin. Dark skin color, ranging from lighter yellowish brown in areas humid or high to darker chocolate brown in drier or lower areas. The brown skin color of the Indians in the United States whom I have seen has also noticeably more of the red and less of the yellow tint than the various brown-skinned Malayan peoples I am familiar with. Dr. Hrdlička says the skin on the back of the hands of aged Indians appears to wrinkle more and the skin on the back of the neck to wrinkle less than that of white persons living under similar conditions; my observations tend to confirm those of Hrdlička.

Hair. The head hair is black, straight and coarse in texture, and grows long, lank, and not abundantly. With extreme age (as 70, 80, or 90 years) the hair may turn somewhat gray—usually yellowish gray, but

not pure white. The hair may also thin on the crown, but well-defined areas of baldness do not occur. The body is only scantily covered with hair, except in the pelvic and axilla areas. The beard growth is thin and scraggly, never covering the surface of the skin on which it grows. It is most abundant on the upper lip and chin, but is particularly absent on the sides of the face, and the hairs seldom or never grow more than three inches long, even on the chin.

Face. The face is angular and rugged, the upper part usually retreating over a low and broad, rather than a high and narrow, forehead. It is wide between the zygomatic arches, while the lower part (from chin to nasion) is high, and cut across by an unusually long mouth opening. The entire face becomes a net-work of deep wrinkles in old age.

Eyes. The iris of the eye is always brown, either dark brown or very dark brown. It is never light brown, and even in the aged is possibly never as light as medium brown in healthy eyes. There is almost a universal disappearance of melanin pigment from the outer rim of the iris of the aged until the brown iris becomes encircled with a band of blue. The sclerotic coat has a slight tendency to exhibit yellow granules—a tendency more than the white man and less than the negro. The Mongolian fold is frequently seen in children, but seldom does it persist in the eyes of adults.

Teeth. Certain teeth are concave on the posterior or inner surface. This concavity is most noticeable in the upper central incisors, though it occurs in the lateral upper, and also in a less extreme manner in the lower incisors. In some individuals it is present in the cuspids also.

Head. The Indian has no distinguishing or typical head-form. Some tribes have the predominant form called dolichocephalic, others brachycephalic, and others mesocephalic.

Nose. In spite of the eagle-beak nose famous in literature as Indian, there is no typically Indian form about Indian noses, except that they are coarse—crudely moulded rather than finely chiseled. All types are found, as concave, concavo-convex, and convex—as Roman and aquiline.

Hands and feet. The Indian has the slight, delicate hands and feet of people who do little hard manual labor. Their hands are of the so-called aristocratic type; while their feet are shorter, rather than narrower, than those of the white and negro peoples.

Other patent physical characteristics. There is nothing characteristic in the stature of the Indian. The women during their prime carry much more adipose tissue than do American white women; they are large, strong, and well-nourished, and are never gaunt and slender.

PHYSICAL CHARACTERISTICS OF MIXED-BLOOD INDIANS

All of the above characteristics tend to become modified in the offspring of the Indian and white amalgamating stocks. The skin tends to become lighter colored; this is especially noticeable in areas relatively unaffected by climatic conditions, as under the clothing. The difference in skin color is well shown in the faces in plate A. The body becomes hairier; the beard growth increases in quantity and length—as all three faces in plate E illustrate. The head-hair becomes lighter in color, finer, softer, and more abundant; often it is wavy—as figure 2 in plate E well shows. It becomes gray earlier in life, not infrequently it is white, and the head often exhibits typical baldness—as figures 2 and 3 in plate D suggest. The face tends to smoothness and to uprightness at the expense of the larger lower part. It tends to become narrower—both absolutely and in relation to the breadth of the head. The iris of the eye lightens, frequently exhibiting the light brown shade, the still lighter hazel, and even the gray and the blue. The concavity of the teeth gradually disappears and the increasing tendency to caries is most persistent. The hands and feet get larger, especially broader and coarser. A slender figure is frequently developed, especially in the women. The tendency is for the individual to assume the physical characteristics of either of the two parent stocks in direct ratio with the preponderating inheritable influence of that stock over the other parent stock. In general, therefore, a hybrid individual of three-fourths Indian and one-fourth white blood will bear measurable physical characteristics more like the Indian parent than the white, and a hybrid individual of three-fourths white and one-fourth Indian blood will bear measurable physical characteristics more like the white parent than the Indian.

FACE-BREADTH HEAD-BREADTH INDEX OF AMERICAN INDIANS IN GENERAL

The earliest measurements of Indian face breadth and head breadth available to me at this time are the skeletal measurements made by Samuel George Morton, published in 1839 in his monumental work, *Crania Americana*.[1] His measurements were made in inches rather than millimeters. I present below, a face-breadth head-breadth index of 95.49 per cent derived from his table of "Mean Results" given on page 259. Morton there summarizes the mean head-breadth measurements of 147 skulls of the "American [Indian] race" and the mean face-breadth measurement of 113 of the same skulls, as follows:

[1] Samuel George Morton, *Crania Americana, or A Comparative View of the Skulls of Various Aboriginal Nations of North and South America*, 296 pp. (Philadelphia and London, 1839.)

TABLE III

FACE-BREADTH HEAD-BREADTH INDEX OF "AMERICAN [INDIAN] RACE" DERIVED FROM MORTON

Number of skulls	Head breadth		Face breadth		Differential	Face-breadth head-breadth index
	inches	millimeters	inches	millimeters	millimeters	per cent
147	5.55	140.97	....	.....	6.35	95.49
113	....	.....	5.3	134.62		

Dr. Morton also presented the head-breadth measurements of fourteen skulls of Great Lakes Algonquin (including Ojibwa and their near tribal kin) and the face-breadth measurements of twelve of the same skulls, from which I derive the average face-breadth head-breadth index of 96.06 per cent, as follows:

TABLE IV

FACE-BREADTH HEAD-BREADTH INDEX OF GREAT LAKES ALGONQUIN SKULLS DERIVED FROM MORTON

Tribe	Head breadth		Face breadth		Differential	Face-breadth head-breadth index
	inches	millimeters	inches	millimeters	millimeters	per cent
Sauk	5.9	149.86	5.6	142.24	7.62	94.91
Fox	5.9	149.86	5.8	147.30	2.54	98.29
Fox	5.9	149.86	5.4	137.16	12.49	91.52
Potawatomi	5.7	144.78	5.2	132.08	12.49	91.21
Ojibwa	5.8	147.30	5.5	139.70	7.62	94.84
Ojibwa	5.5	139.70	5.5	139.70	0.00	100.00
Menomini	5.6	142.24	5.4	137.16	5.08	96.43
Menomini	5.4	137.16	5.4	137.16	0.00	100.00
Menomini	5.7	144.78	5.6	142.24	2.54	98.24
Menomini	5.6	142.24	5.2	132.08	10.16	92.85
Menomini	5.8	147.30	5.8	147.30	0.00	100.00
Menomini	5.7	144.78	...	.....	.....	.....
Menomini	5.6	142.24	...	.....	.....	.....
Menomini	5.4	137.16	5.1	129.54	7.62	94.44

Average face-breadth head-breadth index, 96.06.

In 1903 Professor Frederick Starr published his physical measurements of one hundred Mexican Indian men and twenty-five women from each of twenty-three tribes.[8] I have produced a table giving a differential

[8] Frederick Starr, "Physical Characters of Indians of Southern Mexico," in *Decennial Publications of the University of Chicago*, 1st series 4:51-109 (1903).

and a face-breadth head-breadth index based upon his mean measurements of face breadth and head breadth for each of the twenty-three tribes, as follows:

TABLE V

FACE-BREADTH HEAD-BREADTH INDEX OF INDIAN TRIBES OF SOUTHERN MEXICO DERIVED FROM STARR

Tribe	2300 MEN				575 WOMEN			
	Mean head breadth	Mean face breadth	Differential	Face-breadth head-breadth index	Mean head breadth	Mean face breadth	Differential	Face-breadth, head-breadth index
	mm.	mm.	mm.	per cent	mm.	mm.	mm.	per cent
1. Otomis	147.2	140.7	6.5	95.5	144.6	135.1	9.5	93.4
2. Tarascans	146.5	139.1	7.4	94.9	142.2	133.7	8.5	94.0
3. Tlaxcalans	149.1	140.1	9.0	93.2	143.5	13C.5	13.0	90.9
4. Astecs	146.5	138.1	8.4	94.2	142.8	131.9	10.9	92.3
5. Mixtecs	149.4	142.5	6.9	95.3	143.9	135.7	8.2	94.2
6. Triquis	147.5	140.6	6.9	95.3	142.0	132.5	9.5	93.3
7. Zapotecs	148.7	141.0	7.7	94.8	144.3	134.8	9.5	93.4
8. Mixes	150.7	143.5	7.2	95.1	142.9	133.3	9.6	93.2
9. Zapotecs (Tehuantepecanos)	150.2	142.4	7.8	94.8	145.6	136.0	9.6	93.4
10. Juaves	153.1	145.0	8.1	94.7	148.2	137.4	10.8	92.7
11. Chontals	149.9	141.7	8.2	94.5	144.5	137.5	7.0	95.1
12. Cuicatecs	147.6	139.1	8.5	94.2	141.0	131.0	10.0	92.9
13. Chinantecs	151.9	145.0	6.9	95.4	146.0	135.9	10.1	93.0
14. Chocos	151.0	144.0	7.0	95.3	147.0	136.0	11.0	92.5
15. Mazatecs	150.9	142.1	8.8	94.1	147.0	136.0	11.0	92.5
16. Tepehuas	151.2	142.1	9.1	93.9	148.0	138.2	9.8	93.3
17. Totonacs	153.8	145.3	8.5	94.4	149.8	138.1	11.7	92.1
18. Huaxtecs	150.1	141.9	8.2	94.4	145.8	134.2	11.6	92.0
19. Mayas	154.1	144.2	9.9	93.5	148.7	136.9	11.8	92.0
20. Zoques	146.2	139.5	6.7	95.4	143.1	138.0	5.1	96.5
21. Tzotzils	144.6	140.9	3.7	97.4	138.8	132.7	6.1	95.6
22. Tzendals	144.1	140.8	3.3	97.7	137.0	131.1	5.9	95.6
23. Chols	147.5	141.2	6.3	95.7	141.6	130.2	11.4	91.9

Average face-breadth head-breadth index of the 2300 men, 94.9.
Average face-breadth head-breadth index of the 575 women, 93.3.

In 1908 Dr. Aleš Hrdlička published face-breadth and head-breadth measurements of Apache and Pima men and women. It is from his data of said tribes that the following table is prepared, showing differential and face-breadth head-breadth index:[9]

[9] Aleš Hrdlička, "Physiological and Medical Observations among the Indians of Southwestern United States and Northern Mexico." *Bulletin 34, Bureau of American Ethnology*, 1908.

TABLE VI

FACE-BREADTH HEAD-BREADTH INDEX OF APACHE AND PIMA INDIANS DERIVED FROM HRDLIČKA

Tribe	Number	Head breadth	Face breadth	Differential	Face-breadth head-breadth index
		millimeters	millimeters	millimeters	per cent
Apache men.....	148	158	...	9	94.30
	174	...	149		
Apache women.....	41	155	...	14	90.96
	51	...	141		
Pima men.....	51	147	...	2	98.63
	53	...	145		
Pima women.....	30	144	138	6	95.83

The lowest face-breadth head-breadth index shown in any of the averages for men in the above four tables is 93.20 for one of the tribes of Mexico. It is impossible to know the per cent of Indian blood possessed by the individuals whose measurements are recorded in said tables. Since the Mexican people are an hybrid group of Indian-whites produced during the slightly less than four hundred years since Cortez's conquest, and since the white man has penetrated everywhere in Mexico, it is undoubtedly true that the tribes of Indians measured by Starr in southern Mexico have more or less white blood. The Pima are probably the purest Indians whose measurements we have. The United States Census for 1910 states that the tribe has 0.4 per cent of mixed-blood, or 19 individuals out of a total of 4236. From Dr. Hrdlička's measurements I derive the average face-breadth head-breadth index of 98.63 per cent for 51 Pima men, and of 95.83 per cent for 30 Pima women.

FACE-BREADTH HEAD-BREADTH INDEX OF LAKE SUPERIOR OJIBWA

The following tables are of measurements of adult individuals from my own data.

The head-breadth face-breadth differential (i.e. actual difference between head breadth and face breadth), and the face-breadth head-breadth index (i.e. the percentage which the face breadth is of the head breadth) are shown for each person considered in this study. The differential is relatively unimportant; it is of greatest value in the field because it can be computed at a glance, and one thereby obtains a suggestion of the face-breadth head-breadth index. The measurements of head breadth and face breadth were observed and recorded in half millimeters. The

Photo by Jenks

Figure 1

Photo by Jenks

Figure 2

Pure-blood Indian woman (blind)

Head breadth - - - - - 153.5 mm.
Face breadth - - - - - 144.5 mm.
Face-breadth head-breadth index - 94.13 per cent

Photo by Jenks

Figure 3

Photo by Jenks

Figure 4

Pure-blood Indian man

Head breadth - - - - - 156.0 mm.
Face breadth - - - - - 154.0 mm.
Face-breadth head-breadth index - 98.71 per cent

Figure 1
Pure-blood French man

Head breadth	-	149.5 mm.
Face breadth	-	137.0 mm.
Face-breadth head-breadth index	-	91.63 per cent

Figure 2
Pure-blood Scotch man

Head breadth	-	158.0 mm.
Face breadth	-	147.5 mm.
Face-breadth head-breadth index	-	93.35 per cent

average and the mean variation of each of the above named measurements (except the mean variation of the differential) are also given for each group of persons as shown in each table. The distributions of head breadth, face breadth, and face-breadth head-breadth index are also shown graphically on plate F, figures 1, 2, and 3, respectively.

TABLE VII

24 PURE-BLOOD INDIAN MEN

Showing measurements of pure-blood Indians, and who are not identified as kin of known mixed-bloods

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
159.5	156.0	3.5	97.80
152.0	151.5	.5	99.67
160.5	152.0	8.5	94.70
159.0	152.5	8.5	95.28
160.0	156.5	3.5	97.81
156.0	154.0	2.0	98.71
152.5	148.0	4.5	97.08
158.0	149.0	9.0	94.30
148.5	151.5	+3.0	102.02
155.5	150.5	5.0	96.78
157.5	149.0	8.5	94.60
152.5	146.5	6.0	96.09
156.0	154.0	2.0	98.71
161.0	151.5	9.5	94.09
161.0	157.5	3.5	97.82
161.5	158.5	3.0	98.13
159.5	158.0	1.5	99.05
154.5	148.5	6.0	96.11
156.0	156.5	+ .5	100.30
156.5	152.0	4.5	97.12
158.0	152.0	6.0	96.20
146.5	144.0	2.5	98.29
154.5	149.0	5.5	96.37
159.0	151.5	7.5	95.28
Av.....156.5	152.0	4.4	97.19
M. Var.. 3.06	2.87		1.61

Av.=Average; M. Var.=Mean variation.

Table VII, immediately preceding, contains certain measurements of twenty-four adult males from Lake Superior reservations who in my judgment, from all the measurements obtained, appear to be typical pure-blood Indians. Although the table (like all the others in this article) shows only the measurements of head breadth and face breadth—from which the face-breadth head-breadth differential and face-breadth head-breadth index are derived—yet all individuals studied were measured,

as was stated in the Preface, for head breadth and length, facial breadth and height, nasal breadth and length, color of eye, skin and hair, texture and quantity of hair, and nature of incisors. None of the twenty-four individuals show any evidence of being mixed-bloods except that among the men in table VII and the nineteen women, table VIII, six show by the Bradley Color Top, a skin color test of less than 50 per cent pigment (or more than 50 per cent white). The six are two brothers and a sister who test 50.5, 53.0, and 51.0 per cent white, respectively; two others are sisters who test 51.0, and 54.0 per cent white; and another is a woman who tests 52.5 per cent white. It seems probable that some family tendency toward relatively lighter skin exists among the individuals just mentioned. This tendency to lighter skin may be due to a slight infusion of white blood, or to some purely Indian ancestors whose skins were lighter than the type, perhaps.

TABLE VIII

19 PURE-BLOOD INDIAN WOMEN

Showing measurements of pure-blood Indians, and who are not identified as kin of known mixed bloods

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
148.0	139.5	8.5	94.25
145.0	139.5	5.5	96.20
147.5	142.0	5.5	96.94
149.0	141.0	8.0	94.65
153.5	144.5	9.0	94.13
151.5	143.5	8.0	94.71
151.5	147.5	4.0	97.35
147.0	142.0	5.0	96.79
153.0	152.0	1.0	99.34
149.0	145.0	4.0	97.31
147.5	145.0	2.5	98.30
156.0	148.5	7.5	95.19
140.0	134.5	5.5	96.07
153.5	148.5	5.0	96.74
154.0	145.5	8.5	94.48
150.5	145.0	5.5	96.35
143.5	137.0	6.5	95.47
158.5	151.5	7.0	95.58
152.5	145.0	7.5	95.08
Av.....150.0	144.0	6.0	96.05
M. Var.. 3.58	3.47		1.20

Av.=Average; M. Var.=Mean variation.

FACE-BREADTH HEAD-BREADTH INDEX OF MINNESOTA FRENCH MEN

Table IX presents the measurements of one hundred French men, most of whom were born in Canada but now reside within thirty miles north of Minneapolis. Some of these are the first generation of Minnesota-born French. Seven were measured on or near Lake Superior reservations, and six were measured in Minneapolis. It is probable that a few have a slight infusion of Indian blood, since the French who have come from Canada to Minnesota are practically all from the area where the Pembina Half-breed Nation (French-Indian breeds) flourished during the palmy days of Red River trading posts. The table contains the first one hundred French men measured for this study.

TABLE IX

100 FRENCH MEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
160.0	143.5	16.5	89.68
151.5	142.0	8.5	93.72
144.5	137.0	7.5	94.80
149.5	140.5	9.0	93.31
146.5	135.0	11.5	92.15
153.5	135.0	13.5	87.94
152.5	138.0	14.5	90.49
158.0	147.0	11.0	93.03
162.5	147.5	15.0	92.76
158.5	136.0	22.5	85.80
168.5	150.0	8.5	89.02
155.5	149.5	6.0	96.14
160.0	147.5	12.5	92.18
155.0	139.5	15.5	90.00
149.5	141.5	8.0	94.64
149.0	136.5	12.5	91.61
149.5	135.0	14.5	90.30
155.5	144.5	11.0	92.92
154.0	138.5	15.5	89.93
147.0	138.0	9.0	93.87
150.5	137.0	12.5	91.03
147.0	150.0	+3.0	102.04
152.5	141.5	11.0	92.78
154.0	135.5	18.5	87.98
148.5	137.0	11.5	92.25
158.0	142.5	15.5	90.19
155.0	139.5	15.5	90.00
152.5	135.5	17.0	88.85
153.0	134.0	19.0	87.58
151.5	139.5	13.0	92.07
150 0	137.0	13.0	91.33
150.0	133.0	17.0	88.60
158.5	139.5	19.0	88.01
158.0	148.5	9.5	93.98

TABLE IX—*Continued*
100 FRENCH MEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
156.0	141.5	14.5	90.70
154.0	137.5	16.5	89.28
164.0	149.5	14.5	91.15
154.5	138.5	16.0	89.64
157.5	147.5	10.0	93.65
160.0	143.5	16.5	89.68
161.5	140.0	21.5	86.68
145.0	140.5	4.5	96.89
158.5	140.5	18.5	88.64
152.5	138.0	14.5	90.49
158.0	137.0	21.0	86.70
151.5	142.0	9.5	93.72
155.5	145.0	10.5	93.24
151.5	134.0	17.5	88.44
160.0	151.0	9.0	94.37
148.0	142.0	6.0	95.94
150.0	139.5	10.5	93.00
150.0	136.5	18.5	91.00
157.0	149.5	17.5	95.22
145.0	136.0	9.0	93.79
150.5	141.0	8.5	93.68
162.0	150.5	11.5	92.90
156.5	145.0	11.5	92.65
159.0	141.5	17.5	88.99
149.0	136.5	12.5	91.61
149.5	137.0	12.5	91.63
161.5	136.0	25.5	84.21
151.5	135.0	16.5	91.18
143.0	131.5	11.5	87.12
148.0	131.0	19.0	88.51
141.5	129.0	12.5	91.09
163.5	140.0	23.5	85.62
156.5	139.5	17.0	89.13
161.0	135.0	26.0	83.85
147.5	129.5	18 0	87.75
149.5	132.0	17.5	88.29
157.5	142.0	15.5	90.16
151.0	140.5	10.5	93.04
153.5	135.5	18.0	88.27
149.0	130.5	18.5	87.58
145.5	125.5	20.0	86.25
150.0	132.5	17.5	88.33
155.0	137.5	17.5	88.70
154.0	133.5	20.5	86.62
157.0	144.5	13.5	92.04
150.5	138.5	12.0	92.02
152.5	138.0	14.5	91.14
150.0	137.0	13.0	91.33
165.0	143.0	22.0	86.66
161.0	140.0	21.0	86.95
151.0	143.0	8.0	94.70
147.0	138.5	8.5	94.21
146.0	138.5	7.5	94.86
150.5	145.0	5.5	96.34

TABLE IX—*Continued*
100 FRENCH MEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
156.0	141.5	14.5	90.76
152.0	137.5	14.5	90.46
150.0	142.0	8.0	94.66
160.0	143.0	17.0	89.37
157.5	144.5	13.0	91.74
140.5	129.0	11.5	91.91
145.5	134.0	11.5	92.09
163.0	142.0	21.0	90.93
147.0	128.5	19.5	87.41
150.5	139.5	19.0	92.69
162.5	135.5	27.0	83.38
153.0	133.5	19.5	87.25
Av.....153.4	139.2	14.4	90.85
M. Var. 5.62	4.22		2.41

Av.=Average; M. Var.=Mean variation.

FACE-BREADTH HEAD-BREADTH INDEX OF MINNESOTA SCOTCH MEN

In table x the measurements of fifty Scotch men are recorded. Three-fourths of those men were born in Scotland. They were measured in Minneapolis as members of fraternal clan organizations.

TABLE X
50 SCOTCH MEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
149.5	135.0	14.5	90.30
152.5	139.0	13.5	91.14
156.0	141.5	14.5	90.70
153.5	131.5	22.0	85.66
148.5	139.0	9.5	93.60
152.5	136.0	16.5	89.18
152.0	138.0	14.0	90.78
146.5	131.0	15.5	89.42
147.0	138.5	8.5	94.21
150.0	136.0	14.0	90.66
149.0	139.5	9.5	93.62
146.0	134.5	11.5	92.12
146.5	134.5	12.0	91.80
156.5	142.5	14.0	91.05
146.0	141.5	4.5	96.91
151.0	142.5	8.5	94.37

TABLE X—*Continued*
50 SCOTCH MEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
150.5	135.5	15.0	90.03
149.5	131.5	18.0	87.96
150.0	136.0	14.0	90.66
148.5	129.0	19.5	86.86
156.5	135.5	21.0	86.58
156.5	139.5	17.0	89.13
144.5	121.5	23.0	84.08
152.0	140.5	11.5	92.43
147.5	132.5	15.5	89.83
148.5	135.0	13.5	90.90
141.5	128.5	13.0	90.81
151.5	138.5	13.0	91.41
152.5	135.0	17.5	88.52
143.5	133.0	10.5	92.68
150.5	137.5	13.0	91.36
149.5	141.5	8.0	94.65
143.0	132.5	10.5	92.66
162.5	146.5	16.0	90.15
154.0	135.5	18.5	87.33
147.5	134.0	13.5	90.84
158.0	136.0	22.0	86.07
160.0	145.0	15.0	90.62
160.0	134.5	15.5	84.06
148.5	129.5	19.0	87.20
154.5	151.0	3.5	97.73
148.0	131.5	16.5	88.17
154.5	142.5	12.0	92.23
147.0	125.5	21.5	85.37
160.5	145.0	15.5	90.34
145.5	130.0	15.5	89.34
154.5	142.0	12.5	91.90
160.0	138.5	21.5	86.56
155.0	143.5	11.5	92.58
162.5	147.5	15.0	90.76
Av....151.4	136.8	14.6	90.34
M. Var.. 4.20	4.55		2.20

Av.=Average; M. Var.=Mean variation.

The different tales told by the face-breadth head-breadth index of the so-called pure-blood Ojibwa man and that of the French man and the Scotch man are so striking that it seems it may be possible to use this index as a valuable contributing factor in the solution of the problem of who is a pure-blood Indian and who is a mixed-blood Indian. As the fore-going tables show, the so-called pure-blood Indian has a face-breadth head-breadth index of 94.00 per cent or above, while the typical French man and Scotch man (the two peoples which have contributed most to the Ojibwa amalgamation) average below 91.00 per cent.

FACE-BREADTH HEAD-BREADTH INDEX OF LAKE SUPERIOR MIXED-BLOOD INDIANS

Tables XI, XII, XIII, XIV contain measurements of known mixed-bloods, whose entire measurements proclaim their white blood. Several of those in tables XI and XII show nowhere any measureable evidence of their Indian blood. Their measurements are introduced here, however, solely to show their meaning as to face-breadth head-breadth index. With the exception of the average for the 4 three-fourths white women (table XII) the breadth index, not alone in averages but in individual cases, slips in between that of the so-called pure-blood Indian, and the French and Scotch. The individuals whose measurements are recorded in the four following tables are, with few exceptions I believe, amalgamated French-Indian, Scotch-Indian, and French-Scotch-Indian.

TABLE XI

8 MIXED-BLOOD INDIAN MEN

Known to be three-fourths, or slightly over, white

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
150.0	142.0	8.0	94.66
155.0	137.5	17.5	88.70
150.0	140.5	9.5	93.66
159.5	144.5	15.5	90.59
153.5	138.5	15.0	90.22
157 5	148.5	9.0	94.28
154.5	144.5	10.0	93.52
159.0	145.5	13.5	91.50
Av.....154.9	142.7	12.2	92.14
M. Var.. 2.87	3.06		1.88

Av.=Average; M. Var.=Mean variation.

TABLE XII

4 MIXED-BLOOD INDIAN WOMEN

Known to be three-fourths, or slightly over, white

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
152.0	134.0	18.0	88.15
151.5	130.0	21.5	85.80
152.0	131.0	21.0	86.18
145.0	134.0	11.0	92.42
Av.....150.1	132.2	17.8	88.16
M. Var.. 2.57	1.75		2.15

Av.=Average; M. Var.=Mean variation.

TABLE XIII

12 MIXED-BLOOD INDIAN MEN
Known to be one-half, or slightly over, white

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
156.0	146.0	10.0	93.58
156.0	142.5	13.5	91.34
156.5	149.0	7.5	95.20
154.5	143.0	12.5	92.55
162.0	149.0	13.0	91.97
156.5	150.5	6.0	95.52
158.0	148.0	10.0	93.67
162.0	146.5	15.5	90.43
158.0	144.0	14.0	91.13
152.5	143.5	9.0	94.09
149.0	135.5	13.5	90.93
159.0	143.0	16.0	89.93
Av.....156.7	145.0	11.6	92.52
M. Var.. 2.61	3.12		1.57

Av.=Average; M. Var.=Mean variation.

TABLE XIV

8 MIXED-BLOOD INDIAN WOMEN
Known to be one-half, or slightly over, white

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
154.5	135.5	19.0	87.72
148.0	132.0	16.0	89.19
157.0	141.0	16.0	89.87
150.0	134.0	16.0	89.33
153.0	138.0	15.0	90.19
152.5	141.0	11.5	92.45
149.5	143.5	6.0	95.98
147.0	140.0	7.0	95.23
Av.....151.4	138.1	13.3	91.24
M. Var.. 2.81	3.25		2.48

Av.=Average; M. Var.=Mean variation.

Tables XV and XVI contain, respectively, measurements of sixty men and seventy-four women who exhibit unquestioned factors of mixed ancestry besides the face-breadth head-breadth differential and index.

The individuals are believed to range completely over the field from slightly less than half white to the practical vanishing point of the influence

Photo by Jenks

Figure 1
Typical French-breed
About one thirty-second white

Photo by Jenks

Figure 2

Photo by Jenks

Figure 3

Typical mixed-blood
Probably about one-sixteenth white

Head breadth	159.0	mm.
Face breadth	152.5	mm.
Face-breadth head-breadth index	95.91	per cent

Photo by Jenks

Figure 1
Typical "half-breed" man, a "Pembina half-breed"

Head breadth - - - - - 152.5 mm.
Face breadth - - - - - 143.5 mm.
Face-breadth head-breadth index - 94.09 per cent

Photo by Jenks

Figure 2
Typical "half-breed" man, a "Pembina half-breed"

Head breadth - - - - 149.0 mm.
Face breadth - - - - - 135.5 mm.
Face-breadth head-breadth index 90.93 per cent

Photo by Jenks

Figure 3
Typical "half-breed" man, at least three-fourths white

Head breadth - - - - - 154.5 mm.
Face breadth - - - - - 144.5 mm.
Face-breadth head-breadth index - 93.52 per cent

of white blood. There is a wide range of differential and index. For the men the differential ranges from +2.5 (where the face is 2.5 millimeters wider than the head) to 17.5 (where the face is 17.5 millimeters narrower than the head). The range in index is therefore great, or from 101.62 (which is ultra-Indian) to 88.44 per cent (which is sub-typical for French and Scotch men). There is also a wide range among the women, as from a differential of 2.5 to 22.5; the index range is from 98.34 per cent to 85.14 per cent. Among the women, whether Indian, white,[19] or mixed-blood, there is a lower face-breadth head-breadth index than among the men of the same group.

TABLE XV

60 MIXED-BLOOD INDIAN MEN

Known as such by unquestioned factors besides differential and face-breadth head-breadth index; they are less than half white

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
159.0	156.0	3.0	98.11
156.0	154.5	1.5	99.03
161.5	155.5	6.0	96.28
153.5	156.0	+2.5	101.62
161.5	159.5	2.0	98.76
156.0	142.5	13.5	91.34
154.5	148.5	6.0	96.11
161.5	158.5	3.0	98.14
159.0	152.5	6.5	95.91
156.5	151.5	5.5	96.48
145.0	145.0	0.0	100.00
156.0	146.0	10.0	93.58
162.5	156.5	6.0	96.30
158.5	153.0	5.5	96.53
156.0	152.5	3.5	97.75
151.0	143.5	7.5	95.03
148.0	135.0	13.0	91.21
167.5	155.5	12.0	92.83
162.0	156.0	6.0	96.29
157.5	143.5	14.5	90.97
158.0	145.0	13.0	91.77
156.5	149.0	7.5	95.20
153.5	150.0	3.5	97.78
166.0	152.0	14.0	91.56
165.0	156.0	9.0	94.54
156.0	149.5	6.5	95.84
156.0	145.0	11.0	92.94
156.0	146.0	10.0	93.58
162.0	150.0	12.0	92.59
157.0	144.0	13.0	92.16
159.0	145.5	14.5	91.50

[19] Measurements of white women (French and Scotch) have been made, but are not included in this preliminary paper.

TABLE XVI—*Continued*
74 MIXED-BLOOD INDIAN WOMEN

Head breadth	Face breadth	Differential	Face-breadth head-breadth index
millimeters	millimeters	millimeters	per cent
159.5	143.0	16.5	89.65
157.0	142.5	14.5	90.76
157.5	145.5	12.0	92.38
147.5	137.5	10.0	93.22
141.5	138.5	3.0	97.87
151.0	139.5	11.5	92.38
147.5	137.5	10.0	93.22
149.0	145.0	4.0	97.31
152.0	144.5	7.5	98.36
146.5	133.5	13.0	91.12
144.5	135.5	9.0	93.77
149.0	136.0	13.0	91.27
154.0	141.0	13.0	91.55
154.5	142.5	12.0	92.23
148.0	137.0	11.0	92.56
144.0	138.0	6.0	95.83
148.0	134.0	14.0	90.55
147.5	132.0	15.5	89.49
153.0	142.0	11.0	92.81
152.0	139.0	13.0	91.44
158.5	142.0	16.5	89.58
157.0	142.0	15.0	90.44
161.5	143.0	18.5	86.68
Av.....153.3	141.8	11.4	92.57
M. Var.. 4.52	4.06		2.18

Av.=Average; M. Var.=Mean variation.

CONCLUSION

A summary of the average face-breadth head-breadth indexes for men and women in the different blood-status and ethnic groups may assist to make more clear the meaning of the typical index for each group as shown by the measurements recorded in the various preceding tables.

TABLE XVII

RECAPITULATION OF TYPICAL FACE-BREADTH HEAD-BREADTH INDEXES OF VARIOUS GROUPS

Table	Group	Men	Women	Sex not designated
III	Indian, general, derived from Morton	.....	.....	95.49
IV	Algonquin, derived from Morton....	.....	.....	96.06
V	Indians of Southern Mexico, derived from Starr.....	94.90	93.30	.....
VI	Apache, derived from Hrdlička.....	94.30	90.96	.....
VI	Pima, derived from Hrdlička.....	98.63	95.83	.....
VII, VIII	Ojibwa, pure-bloods.....	97.19	96.05	.....
XV, XVI	Mixed-bloods, less than half white..	94.68	92.57	.....
XIII, XIV	Mixed-bloods, known to be half, or slightly over, white.....	92.52	91.24	.....
XI, XII	Mixed-bloods, known to be three-quarters, or slightly over, white...	92.14	88.16	.....
IX	French.....	90.85	.....	.....
X	Scotch.....	90.34	.....	.....

The following plate, F (figures 1, 2, 3,), presents graphically the head breadth, face breadth, and face-breadth head-breadth index for each of the three hundred and fifty-nine adults considered in this study. The groups of people are arranged uniformly in each of the three graphs, but not according to the order of the preceding measurement tables. The groups appear in the order of decreasing Indian blood and increasingly white blood as arranged from the bottom of each graph to the French and Scotch males at the top, i.e., in the following order:—pure-blood Indian males, pure-blood Indian females, mixed-blood (less than half white) males, mixed-blood (less than half white) females, mixed-blood (half or more white) males, mixed-blood (half or more white) females, mixed-blood (three-fourths or more white) males, mixed-blood (three-fourths or more white) females, French males, Scotch males.

In all three graphs the average is indicated by an arrow (⮟) for the males, and an arrow head (▼) for the females. The heavy line represents the actual number of cases. In figures 1 and 2 the line shows the indis vidual cases at the intervals of 0.5 millimeters exactly as the measurement-were made. In figure 3 intervals of 0.5 per cent are represented. The dotted line represents an increase of the interval from 0.5 millimeters to

1.0 millimeter in figures 1 and 2, and from 0.5 per cent to 1.0 per cent in figure 3 for the purpose of showing more clearly the probable general tendency of the group. This seemed desirable because the small number of cases in most of the groups made great irregularity in the heavy-line curve.

The order of groups used allows one to see the value of the face-breadth head-breadth index (figure 3) as a contributing factor, among the other measurements taken, in determining the blood status of the so-called American Indians. The index of the males is greater than that of the females of the same group, but the gradual lessening of the index with the gradual increase of white blood in the individuals is shown by the movement of the averages, and of the frequency curves from right to left across the graph. Again the value of the face-breadth head-breadth index as a contributing factor in determining the blood status of "Indians" is seen, irrespective of sex, by comparing figures 2 and 3. In figure 3 the lessening is continuous (except for the two small groups of 4 three-fourths white women, and of 8 three-fourths white men). Whereas, in figure 2 (showing face breadth), the lessening is broken in all groups by the fact of sex. The face-breadth head-breadth index is thus shown to be a more reliable factor than is face breadth for determining the blood-status of Indian-white mixed-bloods.

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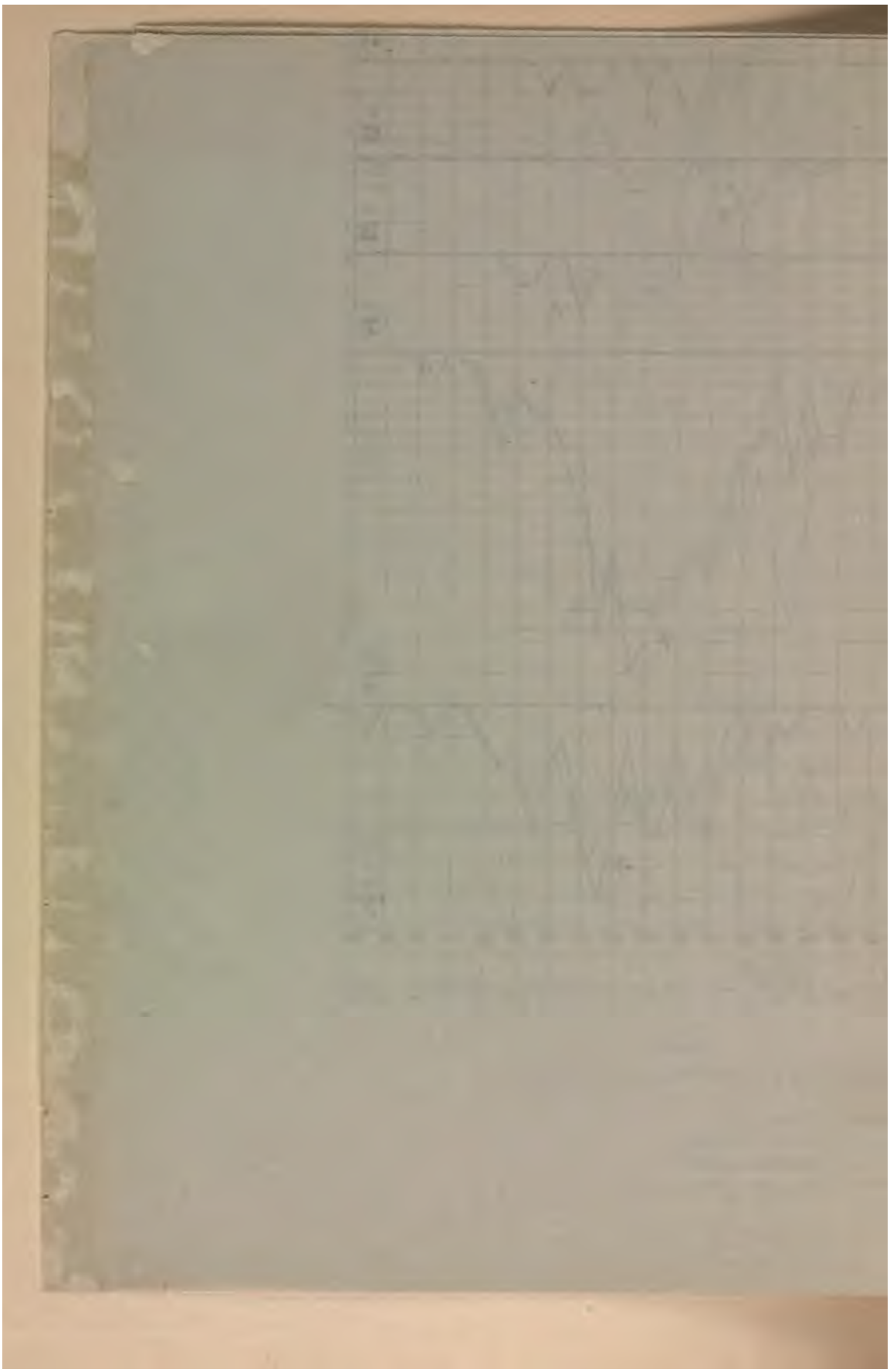

The University of Minnesota

STUDIES IN THE SOCIAL SCIENCES NUMBER 5

SWAMP LAND DRAINAGE WITH SPECIAL REFERENCE TO MINNESOTA

BY

BEN PALMER, M.A., LL.B.
Assistant in Political Science in the University of Minnesota

MINNEAPOLIS
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March 1915

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PREFACE

Nearly all of this paper was prepared at the University of Minnesota in the seminar in Political Science; and the writer gratefully acknowledges his indebtedness to the members of that department, Professors W. A. Schaper, J. S. Young, and C. D. Allin. He is also under obligations to Professor J. T. Stewart, of the College of Agriculture, for many helpful suggestions and criticisms; to Professor E. M. Morgan, of the Law School, and to Mr. Arnold V. Johnston, graduate student in Political Science.

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SWAMP LAND DRAINAGE WITH SPECIAL REFERENCE TO MINNESOTA

CHAPTER I

INTRODUCTION

It has been estimated that there are in the United States to-day approximately 80,000,000 acres of swamp and overflowed lands,[1] an area of unproductive land greater than the Philippine Islands and nearly three times as large as Great Britain and Ireland. When we consider that these wet lands are so vast in extent, that they are unproductive and an economic waste, and that they are in many states so productive of malarial diseases as to constitute a serious and ever-present menace to the lives and health of the people, the importance of the problem of land drainage in the United States is apparent. If—using the suggestion of Chief Hydrographer Leighton, of the United States Geological Survey—this land were suddenly acquired as an outlying possession, there is no doubt that there would be a great movement for its exploitation. Or, "if there lay off our coast such a wondrously fertile country inhabited by a pestilent and marauding people who every year invaded our shores and killed and carried away thousands of our citizens, and each time shook their fists beneath our noses and cheerfully promised to come again, how the country would go to arms, the treasury be thrown open, and how quickly that people would be subjugated!" And yet that is just the situation which our swamp lands, with their great possibilities for development as additional territory for our people and with their cost to the United States in lives lost annually by malarial fevers, present to us.

The benefits to be derived from land drainage are many. The removal of surplus waters results in (1) a greater certainty of a full crop on agricultural lands, because of a reduction in the damaging effect of frost on vegetation; (2) an increase in the yield per acre, with a corresponding permanent increase in the market value of the land; (3) improvement of public highways; (4) benefits to transportation companies because of the increase in freight tonnage due to the raising of more agricultural products;

[1] 60 Congress, 1 session, *Senate Document 443*. All statements as to swamp areas should be read with the caution that estimates vary according to differing opinions as to what constitutes swamp.

(5) benefits to towns near drained districts because of increased business; (6) benefits to railroad companies due to decrease in cost of maintaining trackage, as result of lessening of damages caused by floods and by softening of roadbeds; (7) improvement in public health, due to the elimination of fever and disease breeding swamps and marshes.

Even those lands which, at the present time, are used to some extent for farming, although somewhat wet because of the proximity of swamps and completely inundated areas, will be benefited by the drainage of the swamps, and their productiveness increased. For drainage ventilates the soil and helps to give to plants the abundance of free oxygen which they need. It increases the available supply of soil moisture for the crops, since roots on well-drained land will pierce deeper and be better able to draw on ground waters during drought than roots in less well-drained soils. And, finally, because of the fact that the low temperature of well-drained land does not last long in the spring, seeds may be planted early in the season. [2]

Using an average estimate, although conditions vary greatly according to the engineering problems presented and are affected by topography, we may place the cost of making public drains at approximately four dollars an acre, and, in addition, private drains required to place the land in productive condition at eight dollars an acre, and the cost of subduing and reducing cultivation at five dollars an acre. A fair estimate of the value of such reclaimed lands would be thirty-seven dollars an acre, so that a net profit from drainage work of twenty dollars an acre might reasonably be expected; or a net increase in the market value of the 80,000,000 acres of swamp land in the United States of $1,600,000,000.[3] This reclaimed area could furnish farms for hundreds of thousands of people,[4] and help to take the place of the free homestead lands of the West. Since the improvement is a permanent one, it would increase the value of the agricultural products raised in the United States by millions of dollars per year.

The decrease in malarial diseases as a result of the drainage of swamp lands is well known. It has been demonstrated both abroad and in the Panama canal zone, as well as in the United States itself.

Malarial diseases prevailed in Indiana and Illinois to an alarming extent

[2] F. H. King, *Irrigation and Land Drainage*, 418-429.

[3] 60 Congress, 1 session, *Senate Document 443*, 6. United States Department of Agriculture, *Circular 76*, 10, places the value of drained land at from twenty to sixty dollars, and at four hundred dollars, if it is near cities. Van Hise, *Conservation of Natural Resources*, 3. E. E. Watts, "Drainage Improvement by Dredging," in *Engineering News*, 47:139-140 (1902). Governor A. O. Eberhart, of Minnesota, in an address delivered June 26, 1910, estimated an added value of ten dollars an acre at a cost of only one dollar. J. J. Hill in *Highways of Progress*, 104, estimates an increase in value from two to three times the present value.

[4] Van Hise, in his *Conservation of Natural Resources*, 4, estimates that the reclaimed swamp lands of the United States could support an additional population of 50 million, basing his estimate on the experience of Holland.

prior to the construction of extensive drainage systems in those states. During the period from 1870 to 1890 the number of deaths from malaria in Iowa, Indiana, and Illinois decreased from 52.5 per thousand of the total to 8.6 per thousand, and that was the time of greater drainage activity in those states, so that it is reasonable to conclude that these changes in malarial conditions were due to swamp land reclamation.[5] From the census of 1870 it appears that the deaths from malaria in the lowlands of the Mississippi River from Cairo to the Gulf during the preceding year were 89.8 per thousand of the total. In the census of 1900 we find that for the same territory the deaths from this disease were 88.8 per thousand. Likewise for the southeast coast lands of South Carolina, Georgia, and Florida, the deaths from malaria in 1870 were 66.2 per thousand and in the same territory they were 61.7 per thousand in 1890. In other words, in both these regions there was practically no decrease in the percentage of deaths from malaria during the very period when there was practically no swamp land reclamation being carried on in them. And drainage operations near the city of Charleston, South Carolina, tend further to demonstrate the remarkably beneficial effect of such work upon the health of the people. The white residents of James Island, opposite the city, were formerly obliged to leave the island during the summer months on account of the prevalence of malaria. But they can now safely remain there the whole year round, since no difficulties of this kind whatever have been experienced subsequent to the general introduction of drainage upon the farm lands of the surrounding country.[6] If the only result of the unwatering of the overflowed lands of the United States were an improvement in public health by the substantial reduction of the losses due to malarial diseases, and the other benefits from reclamation were entirely disregarded, the work would still be worth the doing; for it has been estimated that the economic losses due to malaria in this country are not less than $100,000,000 per annum.[7]

The reclamation of these swamp lands will include three distinct operations: (1) The construction of ditches, or the improvement of natural drainage channels, such as will be required by a large number of landowners in common, and will necessitate the use of the power of the state and of legal procedure; (2) detailed drainage on individual farms at private expense and the use of tile or open drains; (3) the subjugation of wild vegetation, the removal of stones and stumps, and the preparation of the soil for cultivation. This discussion will be confined to a consideration of the first of these three operations; that is, it will treat only of the public aspect of swamp land reclamation.

[5] See 60 Congress, 1 session, *Senate Document 443*, 5.
[6] *Ibid.*; L. O. Howard, in National Conservation Commission, *Report*, 3:756.
[7] Howard, L. O., *Reports of National Conservation Congress*, 3:756.

CHAPTER II

DRAINAGE WORK IN COUNTRIES OTHER THAN THE UNITED STATES

A study of the part that has been played by the governments of other countries in the reclamation of swamp and overflowed areas within their borders, and of the general features of their drainage laws, and an attempt to gain some idea as to the amount of wet lands made fit for cultivation by other nations, may help to throw some light on the question, "How progressive have been the drainage methods followed by the states of the American Union?" Of course, economic and topographical conditions vary so greatly in different countries and even in different parts of the same land that no sweeping statements can be made as to the comparative efficiency of the drainage operations carried on in different countries. It would not be strange, however, if a young nation, which is just beginning to need its swamp lands to support a rapidly increasing population, could learn something of value from older countries that have been considering ways of solving the drainage problem, and building ditches and dykes for many years, in some cases, indeed, for several centuries.

In no other country in the world does the problem of land drainage occupy more of the attention of the government and of the people of the state than in Holland, the "Hollow Land." For over six centuries it has been waging a relentless warfare against the waters of the rivers and the sea, its weapons being dykes and ditches. A large part of the country which is now occupied by hundreds of cities and villages and by many thousands of people, was originally submerged, and even to-day between two fifths and one half of the land is below the level of the sea.

In early times, when the Netherlands were sparsely inhabited by uncivilized tribes, the country was a vast morass periodically inundated by the waters of the North Sea. A few years after the territory had been subjugated by Julius Caesar, Pliny wrote of the land as follows: "There the ocean pours in its flood twice a day, and produces a perpetual uncertainty whether the country may be considered as part of the continent or of the sea. The wretched inhabitants take refuge on the sandhills, or in little huts which they construct on the summits of lofty stakes whose elevation is conformable to that of the highest tides. They subsist on the flesh of fish left by the refluent waters, and which they preserve with great care; their fuel, a sort of tuft which they gather and form with the hand." So

Eumenius wrote during the third century: "There was not, in the whole of the immense plain, a spot of ground that did not yield under the footsteps of man;" and Caesar in his Commentaries on the Gallic Wars described the land as being so marshy and level that the rivers had no visible currents. Taine, the French historian of the middle nineteenth century, wrote that "in Holland the soil is but a sediment of mud; here and there only does the earth cover it with a crust of mire, shallow and brittle, the mere alluvium of the river, which the river seems ready to destroy."[1]

The drainage problem with which the Hollanders have had to deal has always been of a twofold character: the waters of the sea must be repelled from the land, and the "inner waters," due to lack of natural drainage and seepage through the porous soil, must be expelled. Along the southern part of the coast sand dunes have formed a natural barrier against the sea, but in the provinces along the northern coast and the islands in Zeeland in south Holland, it was necessary to build great dykes to keep out the sea. After this was accomplished, barriers had to be erected along the lower courses of the rivers in order to keep them from flooding the adjacent low lands at seasons of high tide, or in stormy weather when the waters are driven back up from the sea. After the Dutch had shut out the ocean and rivers by means of dykes, lands were gradually reclaimed by the process of impolding, which consisted in encircling a tract of land with a dyke and then pumping out the water. It was under this system that the great Lake of Haarlem was unwatered. This inland sea had been increasing in size for centuries. In 1531 it covered 6,000 acres, and by 1830 it had an area of 40,000 acres. In 1848 the work of impolding was begun, and by 1852 it had been completed at a cost of $3,893,200. This gigantic enterprise resulted in the reclamation of 41,675 acres of land, which sold for $120.84 per acre. In addition to Haarlem Meer over thirty-eight square miles of territory have been added to the northern provinces since 1877 by enclosing small tracts of shallow shore land at a time.

All this work has been carried on by the government itself. It is reimbursed by charges on the land reclaimed. The dykes and polders are maintained by waterschaps or boards which are responsible to the respective provincial governors and also to a super council which has charge of the main waterways and interprovincial jurisdiction. As a general rule, the cost of maintenance is borne by the different districts, but some of the dykes are of so great a size and of so much importance to the safety of

[1] Of the Netherlands in their natural state, Motley wrote: "It was by nature a wide morass, in which oozy islands and savage forests were interspersed among lagoons and shallows; a district lying partly below the level of the ocean at its higher tides, subject to constant overflow from the rivers and to frequent and terrible inundations by the sea. Here, within a half-submerged territory, a race of wretched ithyophagi dwelt upon terpen or mounds which they had raised, like beavers, above the almost fluid soil." *Rise of the Dutch Republic*, 1:10, 11.

the whole country that they are placed directly under the control of the central government, which makes special appropriations to keep them in repair.

For the last fifty years the hydraulic engineers of Holland, as well as the people in general, have been dreaming of reclaiming the Zuyder Zee. This is eleven times the size of Haarlem Lake, and it comprises more than one sixteenth of the total area of the kingdom. In 1886 an association was formed for the express purpose of forcing the government to take some action as to the matter, and in 1892, as a result of this agitation, the government appointed a committee of twenty-nine to investigate the practicability of draining the Zee. The majority of the commission in 1894 reported in favor of the project. It will cost about $76,000,000 and occupy thirty-three years. It is estimated that the reclaimed land wlll have to be sold by the government at not less than $154 an acre in order to reimburse the state for the expense of the work. This does not seem an unreasonable price, however, since agricultural lands in Friesland, Zeeland, and North Holland are now worth per acre $215, $219, and $300, respectively.[2] The reclaimed land will be sold to peasant purchasers under an amortization scheme calling for forty-five annual payments. The estimated benefits from the project are placed at $500,000,000, and the unwatered area will support 200,000 inhabitants.[3]

Drainage operations in France are carried on by two different agencies: (1) the government, (2) associations of landowners. The government undertakes a drainage work only when it is of too vast an extent to be completed successfully by groups of private landowners, or when the owners of such lands refuse to do a piece of reclamation work which the government considers necessary for the general welfare. When the central government does the work, it assumes one third of the cost itself, and apportions one sixth to the department and one half to the owners of the land.

The chief steps in the procedure where the government itself conducts the drainage operations are as follows:

1. The state designates the lands which it deems advisable to drain, and submits the proposition to the landowners.

2. The latter meet and decide whether they wish to undertake the work themselves.

[2] Land that is cultivable sells at remarkably high prices in Holland. South of Haarlem bulb land rents for from sixty to eighty dollars an acre and sells for from $1,600 to $1.800. The raw land reclaimed by the Y polders, when the North Sea canal was opened, sold at auction as high as $540. E. D. McQ. Gray, *Government Reclamation Work in Foreign Countries*, 25.

[3] Gray, *Government Reclamation Work in Foreign Countries;* J. J. Hill, "Our Wealth in Swamp and Desert," in *World's Work*, 19:12595-12617 (1910); Guy E. Mitchell in *World Today*, 13:727 (1907); S. Tatum, "Reclamation and Drainage in the South," in *Annals of the American Academy of Political and Social Science*, 35:77 (1910); Missouri Bureau of Labor Statistics, *Supplementary Report*, 1910, *Draining Missouri Low Lands*, 7-10.

3. If the owners refuse to carry out the proposed drainage, then the government decides whether it will do the work itself, or grant it to a concessionary.

4. The state engineers draw up the plans (or approve the plans of other parties if the work has been granted to them) and exercise general engineering supervision over the construction work.

5. The president appoints a special commission to have charge of the whole project, and a board of appraisal is created to make assessments and determine damages. The prefect of the department, the minister of public works, and a syndicate representing the landowners, each appoint one member of this appraisal board, the findings of which must be approved by the departmental legislative assembly. Appeals from assessments may be taken to the presidential commission which has charge of the work.

The most important drainage undertakings that have been accomplished by the government under this law embraced 1,640,000 acres of land. In 1879 the Forez project, including 140,000 acres, was completed, and in 1865 that of LesLandes and LaGironde, comprising 1,500,000 acres of swamp. What were formerly fever-stricken, sandy marshes are now agricultural and forest lands. The average life of the inhabitants of these regions has been lengthened by more than four years, and the lands have increased in value from fifteen dollars an acre to over fifty dollars. In 1879 there were over 1,365 miles of main canal in LesLandes and La Gironde. Half of this reclaimed area belongs to towns which paid their assessments for the cost of the work by selling 466,000 out of the 720,000 acres of the drained land which they owned, so that no state funds were used. The prefects of the various departments in which the lands are located supervise the maintenance of these governmental works, but the cost of such maintenance is borne by the landowners.

The second agency by means of which lands have been drained in France is the association of landowners. There are two kinds of associations which may carry on drainage operations: (1) those organized by mutual consent of all concerned, (2) those whose organization is controlled by a majority of the owners. Members of the first class may construct drains through the lands of their number, but they do not have the privileges of quasi-public associations. In the associations of the second class proceedings are instituted by means of a petition presented to the prefect of the department, and then, if two thirds of the owners of the land in the proposed district, who pay three fourths of the taxes, or three fourths of the owners who pay two thirds of the taxes, vote at a public meeting in favor of forming a drainage association, the petition is submitted to the minister of public works. If the latter, on the advice of a local improvement committee and of the department commissioner of agri-

culture, decides that the proposed work will be of public utility, the prefect calls a meeting of the landowners of the district. These elect officers, a representative assembly to make rules and apportion assessments and damages, and a board of trustees to supervise the construction and maintenance of the work. These associations have the power of eminent domain, and may be granted loans by the central government from a fund of $20,000,000 which was appropriated in 1856 to aid irrigation and drainage works. These loans are payable in twenty-five yearly installments, are collected in the same way as general taxes, and are a lien upon the land. This landowners association law was enacted in 1865, and amended in 1894. Under it over fifty associations have been organized to drain more than 700,000 acres. Before 1865 several thousand acres of swamp land had been reclaimed under a law much like that of 1865, and these associations still exist for the maintenance of the ditches which they have constructed.[4]

There have been three great drainage acts in England. In 1846 Parliament passed the Public Moneys Drainage Act, the purpose of which was to facilitate drainage works by advances of money to a limited amount on the security of the land to be improved. Twenty-two-year loans were made to landowners on application to the inclosure commissioners. Although the sum of £2,000,000 for Great Britain, and £1,000,000 for Ireland was set aside by the act for advances, yet the fund was soon exhausted, and in 1849 the second great drainage act was passed. This, the Private Moneys Drainage Act, authorized landowners, with the sanction of the inclosure commissioners, to borrow or advance money to be expended in land drainage. Various improvement and drainage companies were organized to take advantage of the provisions of the law. After 1849, however, the government gave no direct aid to drainage projects. The third important drainage law was the act of 1861 which applied only to England. This statute authorized the formation of elective drainage districts under the supervision of the inclosure commissioners, and provided that the cost of the work should be charged against the land rentals and payable in installments to run for periods not to exceed thirty years.

The principal steps in the procedure, which is strikingly similar in its main features to that in many of our states, are as follows:

1. A petition signed by the proprietors of not less than one tenth of the proposed district is presented to the inclosure commissioners. This petition must describe the lands which it is proposed to drain, and be accompanied by a guaranty on the part of the petitioners of the payment of all preliminary expenses.

[4] George Wilson, in Institute of American Engineers, *Minutes of Proceedings*, 1879, vol. 55: 234-240; 60 Congress, 1 session, *Senate Document 443*, 12-14; Gray, *Government Reclamation Work in Foreign Countries*, 12-14.

2. The inclosure commissioners send an inspector to examine the lands to be affected by the proposed project, and to examine the same and report thereon.

3. If the inspector's report is favorable, the commissioners may issue a provisional order. This order when confirmed by Parliament establishes the drainage district.

4. The construction of the work is supervised by a drainage board elected by the property owners of the district.

It has been estimated that one fifth of the most fertile lands of Great Britain and Ireland have been drained.[5]

In Austria government aid is given to drainage enterprises (as to other reclamation projects), both by the province in which the land affected is located, acting through the provincial legislature, and by the imperial government, acting through the minister of agriculture. Whenever a district, commune, or water association desires aid, it petitions the provincial legislature to that effect and, if the petition is favorably received, a legislative committee decides which of two alternative plans of financing the work shall be adopted: (1) either the parties directly interested may be assessed to an amount not exceeding thirty per cent of the estimated cost of the enterprise, and the balance made up from the provincial budget and by an appropriation by the minister of agriculture from the reclamation fund (such appropriation not to exceed thirty per cent of the cost of the work), or (2) the provincial government may contribute not to exceed twenty per cent of the total cost, or else loan money for carrying on the work. The general object of both of these financial schemes is to divide the expense of draining lands equally among the imperial government, the provincial government, and the parties directly interested. (When these last are represented by a district or commune, the government grants are usually nonpayable and amount to direct appropriations rather than loans.) Construction is done by public contract; maintenance, by water associations formed for that purpose.[6]

Drainage operations in Prussia have been carried on in three ways: (1) by private drainage associations, (2) by public drainage associations, (3) by the government itself.

The private drainage associations are the agencies especially employed in reclaiming small tracts of swamp land. They are merely a kind of partnership and are entirely free from government control.

Public drainage associations are incorporated with the approval of the minister of agriculture and of the provincial or communal authorities, for

[5] Guy E. Mitchell in *Review of Reviews*, 37:433, cites Professor Shaler as authority for estimate; Gray, *Government Reclamation Work in Foreign Countries*, 47-49.

[6] *Ibid.*, 5, 6.

the purpose of reclaiming extensive tracts of land when the owners are not unanimously in favor of the work. Before the association can be incorporated it must be proved of public utility and beneficial to agriculture, and approved by a majority of the landowners whose lands are affected. In those provinces where there is a considerable amount of swamp land, there are imperial commissions which advise the minister of agriculture, make plans for proposed work, and aid associations in complying with the requirements of the drainage laws. The chief steps in the procedure involved in the work of public drainage associations are: (1) presentment to the minister of agriculture of a petition, (2) its approval and reference to the Prussian Diet for an act of incorporation,[7] (3) the preparation of detailed plans and issuance of orders for removal of dams or appropriation of necessary private property, (4) the levy of assessments in proportion to benefits. Damages are determined by a board consisting of one member each appointed by the claimant for damages and a landowner desiring the work, and a third member. Appeals may be taken to the courts. The assessments for benefits are collected like regular taxes and the association may borrow money secured by first mortgages on the land.

In 1906 there were 1,400 drainage associations in Prussia, and 700 so-called "dyke associations" operating over an area of 756,139 and 39,953,670 acres respectively (total, 40,709,809 acres). The most striking example of reclamation work in northern Germany was the completion of the diking and maintaining of the Memel Delta, between the Ross and Gilge rivers, which for centuries had been periodically overflowed. Although it was first attempted to drain part of this area as early as the first quarter of the seventeenth century, the year 1901 had been reached before 65,700 acres had been reclaimed.[8]

The private and public drainage associations confine their operations to the reclamation of lands which are principally owned by private individuals, so that the work which the government has done has been almost entirely concerned with the drainage of morass and fens, which are usually crown lands. These government operations are not carried on under any general laws but the Diet makes special enactments to cover each separate undertaking. There is a central morass commission which superintends the projects undertaken by the state and conducts an experiment station for investigating the best methods of swamp land drainage. As early as 1868 the government began to make loans for drainage purposes to tenants of the crown lands.[9] In 1890 it began to drain morass and fens itself and from 1892 to 1901 appropriated 1,722,000 marks ($408,000) to carry on the work. It has been the policy of the government to colonize

[7] Afterward the association is under the supervision of the town or provincial authorities.
[8] One of the associations involved in the work has had a continuous existence since 1613.
[9] Which have averaged 400,000 marks annually.

these reclaimed areas and to reimburse itself for the costs of drainage by selling or renting the lands reclaimed.[10]

Drainage works in Italy are of two classes: (1) those wholly or chiefly for sanitary purposes, (2) those wholly or principally for agricultural purposes. The works of the first class are under the complete control of the central government, but it may delegate to the provincial or communal governments or to interested landowners the authority to construct the drainage works required. The state pays six tenths of the total cost of these sanitary projects, the province one tenth, the commune one tenth, and private landowners two tenths, the latter being assessed in proportion to benefits received by them. Even if a province or commune is actually outside of the drainage district, it will be required to contribute to the cost of the work if it can be shown that it will be benefited therefrom in any way. The communes levy a special tax to pay their share of costs, and these assessments constitute a lien on the lands of those assessed. Damages are awarded to persons whose property is taken, by a court representing the minister of public works, the landowners, and the judiciary; and appeals may be taken from this court of arbitration to the ordinary courts of law.

Non-sanitary works, or those of the second category, may be constructed by associations of landowners acting under the provincial prefect, or by individuals. Voluntary associations may be formed by mutual consent of all landowners concerned. Compulsory associations may be organized either on the initiative of the government or of interested landowners. If the government commences the proceedings, then the individuals interested pay only seven tenths of the cost; the remainder of the burden is borne by the national government, province, and commune in equal portions. But if the owners of swamp land initiate the proceedings, they must pay all the costs. Both compulsory and voluntary associations have the power to levy taxes in proportion to benefits, to borrow money, and to take private property required in carrying out drainage work.

Some idea as to present and prospective reclamation work in Italy may be gained from the fact that between 1900 and 1924, $36,544,800 will have been spent for works of the first class (that is chiefly sanitation, especially the Pontine marshes),[11] and $12,285,000 for work of the second class undertaken by associations.[12]

[10] Authorities on Prussia: Gray, *Government Reclamation Work in Foreign Countries*, 15-19; 60 Congress, 1 session, *Senate Document 443*, 14-16; *Scientific American*, 102:165 (1910).

At the present time Prussia is engaged in the reclamation of 16,000 acres of the Friedburg peat bogs in East Friesland. Not only are the lands being reclaimed, but the peat is being used to create electric current, and for other commercial uses. *Scientific American*, 102:165 (1910).

[11] The government, provinces, and communes will contribute $29,700,000 to the cost of this work.

[12] 60 Congress, 1 session, *Senate Document 443*, 16-18; Gray, *Government Reclamation Work in Foreign Countries*, 19-24.

For more than fifty years systematized efforts have been made in Belgium to reclaim the marshes of limited area located east of the Sambre and the Meuse. These swamps seldom cover more than 250 acres each, but they have seriously affected the health of the inhabitants of the surrounding country. Nearly all the drainage work that has been done so far has been accomplished by associations (wateringues) either individual or communal, acting under the supervision of the minister of public works or of agriculture. As a general rule the state has paid about one half of the cost of the work. The largest marshes reclaimed up to the present time do not comprise more than 250 acres each in area, and are found chiefly in the province of Luxembourg. This land has doubled and frequently trebled in value.[13]

In European Russia reclamation work is carried on at government expense only on the crown lands. Technical assistance furnished to private landowners must be paid for at a regular rate, but in case of associations of peasants this charge is remitted. As to non-crown lands either private landowners or interested communities must take the initiative; and, if the government provides any engineers, they must be given entire control of the work. The chief drainage works so far completed by the government have been devoted to reclaiming swamps in the northern and west-central provinces.[14]

In Denmark the Rigsdag usually makes a yearly appropriation for drainage work, the money to be loaned under the direction of the department of agriculture. If the petition for a loan is granted, the debt must be amortized in forty-two years. The individual landowners desiring public aid must petition the governor of the province stating in detail their financial condition, and giving a description of the land to be drained. In 1906 the state loaned about $10,720 to aid in the reclamation of swamp lands.[15]

Until recently, the government of Greece has not participated in land reclamation beyond granting concessions on certain conditions to individuals and associations formed for the drainage of swamp lands as business enterprises. There is no general drainage law, a special act being passed to cover the agreements with the different companies.

The only work of any importance that has been accomplished thus far has been the draining of Lake Copias. This lake in Boeotia was surrounded by swamp; the total area of the marsh and lake was more than 600,000 acres. Ruins of an extensive canal dating from the heroic age, and probably the work of the Minyoy of Orchomenos, tend to show that a part of the swamp was drained and cultivated in ancient times. No at-

[13] 60 Congress, 1 session, *Senate Document 443*, 16; Gray, *Government Reclamation Work in Foreign Countries*, 8-10.

[14] *Ibid.*, 34-38.

[15] *Ibid.*, 102-103.

tempt, however, was made to drain the lake after the classical era until 1880, when a French company secured a concession. The ditches required to reclaim the land were built after six years of work, and the lake was then emptied in forty-nine days. By 1894, 17,500 acres of reclaimed land were in cultivation. The contract with the drainage company provides that at the end of ninety-nine years two thirds of the total area reclaimed shall revert to the state (estimated at 40,000 acres), and one third continue to be the property of the company.[16]

Although most of the shallow lakes, sloughs, and peat bogs of Norway are in private hands, yet the Storthing makes annual appropriations for their drainage. Up to 1910, $5,000 a year has been appropriated. These contributions, however, have thus far been inadequate to result in the reclamation of very much land. Persons seeking government aid apply to the inspectors of their respective departments, who draw up plans and specifications and estimates as to the probable cost of the work, and may report in favor of the project to the agricultural department. Thereupon the government contributes one fourth of the cost of the work as a free gift. The construction of the ditches is under the control of the government. Some state lands have been drained as a result of special appropriations by the Storthing on the recommendation of the department of agriculture. No statistics as to the total area of reclaimed land in Norway are available, but in a district called the Jaderen near Stavanger about 6,000 acres have been drained.[17]

Private landowners in Sweden may engage the government engineers to carry on drainage work at the expense of such owners, or they may receive direct monetary aid from the government, provided their applications for such assistance are approved by the direction of highways and waterways and the ministry of agriculture. Such grants may amount to the total cost of the work, but they must be repaid in installments and, until they have been fully amortized, the works constructed remain in the control of the government engineers. Nothing is available to throw any light upon the question as to how much work has actually been accomplished in Sweden further than the fact that in 1907 the government appropriated 500,000 kroner ($134,000) to be loaned for a long period of years to landowners in Norland for drainage purposes.[18]

In Algeria the government and private syndicates began drainage operations over fifty years ago. They have completed three great projects: (1) the unwatering of the valley of the Gardens of Mortaganem at a cost of $26,000, (2) the drainage of Lake Halloula, which had been in winter a sheet of water covering 5,000 acres and in summer a malaria-breeding

[16] *Ibid.*, 103-105.
[17] *Ibid.*, 106-107.
[18] *Ibid.*, 108-109.

swamp, (3) the reclamation of the plain of Mitidga, just south of Algiers. This is now one of the richest agricultural regions in Algeria, but before its reclamation it was a marsh so pestilential as to be known as "the grave of the Europeans." [19]

In Australia the government of Victoria has expended national funds through its department of public works. These funds were used to drain crown morass lands covering over 74,000 acres, the state being repaid from the sale of the drained land at enhanced prices, and benefited by the increased settlement of the reclaimed areas. No work had been undertaken up to 1910, either by municipalities or by any private associations under concessions, but all drainage operations of any considerable magnitude had been undertaken directly by the state. In New South Wales an act of 1906 provided for loans from the state treasury for draining malarial swamp lands. Owing to continuous wet weather and lack of surveyors only 10,000 acres had been reclaimed up to 1910, although applications had been made under the act for aid in draining nearly 170,000 acres.[20]

In South America as far as can be learned no government action has been taken in regard to land drainage, and practically no swamp lands have been reclaimed.[21]

One of the most interesting and important drainage undertakings that has been accomplished in any country of the world has been carried on in Mexico. The valley of Mexico occupies an area of approximately 2,700 square miles. It is more or less elliptical in configuration and is surrounded on all sides by mountains and extinct volcanoes, some of which rise to a height of over 11,000 feet above the level of the sea. In the range of mountains to the north there is a sharp depression, and ever since the sixteenth century the inhabitants of the valley have discussed the problem of draining off through this depression the waters collected in the low-lying land around the city of Mexico.

As early as 1607 the first important attempt was made to drain the valley, when one Enrico Martinez cut a tunnel through the mountains at Nochistongo for four and one-tenth miles. Although this tunnel was about thirteen feet square, it was finished in the incredibly short period of eleven months. The wonderful speed with which the work was accomplished was due in part to the soft character of the soil, and to the fact that the Spanish government pressed thousands of Indians into service and employed them in several shifts so that there were practically no interruptions in the construction of the tunnel. Owing to the great haste with which the work was done no masonry was put in the tunnel. Consequently it collapsed with the first torrential rain, and from 1629 to 1634 the City of

[19] *Ibid.*, 47-48.
[20] *Ibid.*, 87-90.
[21] *Ibid.*, 108-115.

Mexico was almost continually flooded. It is estimated that at this time over thirty thousand people perished in one month. As a result of this disastrous flooding of the valley of the Spanish government ordered that the City of Mexico be moved to a position higher up in the valley. But owners of city property, estimated to have been worth over $50,000,000, did not wish to abandon their land, for they believed that the valley could be drained satisfactorily at a cost of $3,125,000. In 1637 it was decided to change the tunnel into an open ditch about 197 feet in depth, but it was not until over a century and a half had passed by that the work was completed (1789). Over $3,900,000 was spent on the project, and it cost the lives of countless Indians; but when the work was finished it was discovered that the ditch was of very little use since its bottom was nearly thirty feet higher than the level of Lake Texcoco. The War of Independence and various revolutions prevented any further consideration of the drainage problem in Mexico until 1856. In that year a government commission decided upon a plan to carry off the surplus waters of the valley through a ditch connecting several lakes. But actual construction was prevented by the Civil War and the French occupation. In 1866 the Emperor Maximilian inaugurated a period of active work which lasted until 1867, when the empire fell. Civil wars from 1868 to 1881 rendered drainage operations intermittent, but in 1885 the government appropriated $415,000 a year to be used by a new commission, and the City of Mexico borrowed $12,000,000 to aid in the work. Operations had formerly been conducted directly by the government, but they were now turned over to contracting companies. The construction of a canal twenty-nine and a half miles long was commenced by the contractors in January, 1890, and completed in June, 1896. About 10,000,000 cubic yards of earth were excavated by dredges and 6,000,000 by hand labor. The canal now carries the sewage of the City of Mexico out of the valley; protects the city from inundation by controlling the level of the near-by lakes; and prevents the accumulation of water in those shallow lakes and marshes which had for centuries been a fever-breeding menace to the inhabitants of the valley.[22]

From the foregoing discussion it appears that European countries, with the probable exception of Russia, have not been backward in the work of swamp land reclamation through public action. A considerable amount of marsh and overflowed soil has been made fit for cultivation; and the practicability and wisdom of such work have been demonstrated from an engi-

[22] John B. Body, in article published by the Institute of Civil Engineers in the *Engineering Record*, 44:131-134 (1910). Mr. Body was engineer in charge of the work during 1892 and 1893. His article is practically the only discussion on the subject, except for a few brief references in magazine articles. Mr. Gray in his *Government Reclamation Work in Foreign Countries*, 105, states that it has not been feasible, even with the help of the American consular service, to obtain particulars concerning the drainage of the valley of Mexico (1910).

neering or sanitary standpoint, as well as shown to be a profitable business investment. A comparison between the method of instituting and conducting ditching operations in lands other than the United States, and that followed in this country, as described in the following chapters, reveals a few important differences. Most of these are to be explained by the fact that greater constitutional limitations exist in America, and a different theory of government and its proper sphere prevails here, from that recognized abroad. The national government here has taken no part in drainage work, nor have the states except in a few instances, participated directly therein further than to enact general drainage statutes permitting the coöperation of landowners; while it is common for the central authority in foreign lands to aid such work by loans or by the direct appropriation of funds. Furthermore, while it is true that in France, Belgium, Italy, Austria, and Prussia associations of landowners may unite in the construction and maintenance of public ditches, state work and influence are very great. The complete control of operations by interested private individuals throughout the proceedings, and the inauguration of work on their initiative rather than on that of the government, which is the characteristic feature of the American scheme of swamp land reclamation, is noticeably absent.

CHAPTER III

SWAMP LAND RECLAMATION IN STATES OTHER THAN MINNESOTA

It has been estimated that there were originally over 125,000,000 acres of swamp and overflowed lands in the United States;[1] an area of unproductive land as large as either Germany or France, or more than three times as great as all the New England States.[2] These wet lands were of two kinds: (1) tidewater or delta overflowed lands, (2) glacial swamps. Those of the first class extended from Virginia to Texas. In Florida there were about 19,800,000 acres; in Louisiana, 10,316,605 acres; in Mississippi, 5,760,200 acres; in Arkansas, 5,911,300 acres; and in North Carolina, South Carolina, Alabama, Georgia, and Texas, from 3,122,000 to 1,500,000 acres each. These lands include such swamps as there are along the lower course of the Mississippi River, the Jersey Marshes, and the Dismal Swamp of North Carolina and Virginia. The wet lands of the second class, that is, the glacial swamps, were most extensive in Minnesota, which had 7,332,308 acres; Michigan, 4,547,439 acres; Illinois, 4,421,000 acres; and Wisconsin, 2,560,000 acres.[3]

Because of the abundance of drier and better lands even in the eastern part of the United States, it was not until the middle of the nineteenth century that these wet lands received any attention from either state or federal government. Until 1850 all the great swamp tracts, except those included in the thirteen original states (Dismal, Okefinokee, eastern seaboard plain, Jersey marshes, and tidal lands of New England), remained in the national estate. In 1847 Senator Westcott, of Florida, introduced in the Senate a bill for the grant to his state, for the purpose of reclamation, of the overflowed lands surrounding Lake Okechobee, but it failed of passage.[4] About the same time a movement sprang up in the Middle West for the building of levees along the rivers; conventions were held in Memphis, St. Louis, and Chicago; and as a result of their resolutions and influence and of subsequent agitation, Congress was forced to take some action. It was not itself willing to undertake the work of building levees

[1] Guy E. Mitchell in *Review of Reviews*, 37:433 (1908).

[2] *World Almanac*, 1914, p. 424. Area in square miles: Germany, 208,780; France, 217,054; Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, total, 66,465; 125,000,000 acres equal 195,312 square miles.

[3] Classification by Van Hise in *Conservation of Natural Resources*, 344. Estimates by the United States Department of Agriculture, 60-61 Congress, *Senate Document 443*.

[4] Trustees of Internal Improvement Fund of Florida, *Minutes of Proceedings*, 7:415-437.

and draining lands but as there were in the Mississippi Valley over 32,000 square miles of swamp lands belonging to the nation, it began its policy of giving this land to the states for reclamation purposes by an act of September 28, 1850, entitled "An act to enable the State of Arkansas and other States to reclaim the swamp lands within their limits."[5] This act provided that "the proceeds of said lands whether from sale or by direct appropriation in kind, shall be applied exclusively, as far as necessary, to the purpose of reclaiming said lands by means of (the) levees and drains (aforesaid)." Later this act was extended to cover other states having swamp lands within their borders. By virtue of the definition in the act of Congress itself of the terms "swamp and overflowed lands," the grants conveyed all lands which in their natural state are unfit for cultivation because of the large amount of moisture in the soil. The states were given their choice of two methods of selection: (1) The field notes of the government survey could be taken as the basis for selection, and all lands shown by them to be swamp would pass to the states, or (2) the states could select the lands by their own agents and report the same to the Secretary of the Interior with proof as to the correctness of their selections.[6] Up to the year 1908 claims for 65,582,503 acres had been approved, and over 63,000,000 acres actually patented to the states.[7]

What has been actually accomplished towards making habitable and tillable these vast areas of wet lands which have been granted by the national government to the states, may best be seen by a review of the work which those states have done in reclamation and drainage, considering each state with reference to its own particular problems.

Florida has more overflowed lands within its borders than any other state in the Union. The Everglades surround Lake Okechobee in the south central part of the state, and from there stretch due south for one hundred miles to Cape Sable, ranging from twenty to forty miles in width, and comprising over 3,700,000 acres—an area greater than one-half of Florida, or the combined land surface of Connecticut, Rhode Island, and Delaware. Here and there in this region there are stretches of prairie land, but most of the Everglades are a saw-grass marsh with soil from three to fifteen feet deep, covered with five inches of water during the greater part of the year, and for many years the haunt of nothing but birds, mosquitoes, alligators, and snakes; penetrated not by white men, but only by the Seminole in his canoe.

From 1837 to 1860 various officers of the United States Army, stationed on the eastern coast of Florida, attempted to cross the glades, and during

[5] J. L. Matthews, *Conservation of Water*, 149, 150.
[6] Act of September 28, 1850.
[7] Guy E. Mitchell in *Review of Reviews*, 37:433 (1908).

the Seminole wars did considerable exploring.[8] In 1892 J. E. Ingraham succeeded in crossing the Everglades about forty miles south of Lake Okechobee, and during the last fifteen years various hunters and naturalists have worked their way through the swamps from the lake to Miami, so that to-day the mystery of the Everglades has been dissipated.[9]

As early as 1835 public men began to discuss the feasibility of draining the glades.[10] In the latter part of the very year in which Florida was admitted into the Union (December, 1845), its legislature by resolution pressed upon the attention of Congress the propriety of appointing engineers to survey the region. Shortly afterwards the Secretary of the Treasury at the request of Senator Westcott, of Florida, appointed Breckinbridge Smith to make an investigation into the problem of the Everglades. The latter's report, which was issued in 1848, spoke very favorably of the project to reclaim the overflowed lands of the peninsula. On January 23 of the same year (1848) General W. S. Harney wrote: "Of the practicability of draining the Everglades I have no question. That such work would reclaim millions of acres of valuable lands, I have no doubt." And many other public men of the time were strongly in favor of the plan to drain this Florida swamp.[11] In 1849 the legislature of Florida asked Congress to grant the Everglades to the state, "on condition that the state will drain them and apply the proceeds of the sale thereof, after defraying the expenses of draining, to the purpose of education."[12] In the same year, as we have already pointed out, Senator Westcott's bill for the grant of these lands to the state failed of passage in Congress,[13] but the act of September 28, 1850 named Florida as one of the grantees of swamp lands; so that it was in that year that the Everglades were granted to Florida.[14] But it was not until thirty-one years after the swamp lands within its borders had been granted to Florida that it made any effort to reclaim them for use. In 1881 the Trustees of the Internal Improvement Fund, to whom the legislature had granted the swamp lands of the state "irrevocably," for the purpose of reclaiming them, made a contract with a company headed by Hamilton Disston, the saw manufacturer of Philadelphia, which provided that the company should drain 9,000,000 acres of land adjacent to Lake Okechobee and render them "fit for cultivation by permanently lowering and keeping

[8] Expeditions by Major Childs in December, 1841, and Captain Dawson in 1855. S. N. Ball, "Reclaiming the Everglades," in *Putnam's Magazine*, 7:796 (April, 1910).

[9] S. S. Lupfer, "The Florida Everglades," in *Engineering News*, 54:278-280 (September 14, 1905).

[10] S. N. Ball, in *Putnam's Magazine*, 7:796 (April, 1910).

[11] For a series of letters relating to the scheme, see 62 Congress, 2 session, *Senate Document 89*.

[12] *Ibid.*

[13] T. E. Will, "The Everglades of Florida," in *Review of Reviews*, 66:451-456 (October, 1912).

[14] Act of September 28, 1850.

reduced the waters of Lake Okechobee."[15] Disston and his associates were to do the work at their own expense, and were to receive as consideration a grant of the alternate sections of land drained. This inaugurated the first of the two successive policies of reclamation adopted by the trustees, namely, (1) by the letting of contracts, (2) through construction work under the trustees themselves. The first policy may be said to have prevailed from 1881 to about 1905.[16] In 1898 a contract was made with the East Coast Drainage and Sugar Company for draining 8,000,000 acres of land at the expense of the company, the land to be conveyed in fee to the corporation upon payment to the state of twenty-five cents an acre. Not a single yard of earth was removed by the company under the contract. The trustees made a few other contracts of the same kind, but these involved much smaller amounts of land.

Not only did the state grant much of its swamp lands to drainage companies, but the legislature made extensive grants to railroads (evidently, though not expressly, on the condition that the grantees should reclaim from water the lands granted), and actually deeded over 8,000,000 acres of swamp lands to these transportation companies. But the results of these grants, so far as any progress in reclamation was concerned, were so "diminutive that no record has been made of them."[17] These grants to railroads involved the trustees in a great deal of litigation which is still somewhat unsettled, imperiled the drainage fund itself, and for a considerable period of time completely tied the hands of the trustees and prevented their taking any steps towards reclamation.[18] It is true that the Disston Company built about ninety miles of canals, but their work had no effect on the drainage of the Everglades. A few acres were really well drained in the Kissimmee Valley, but this was under unusually favorable conditions, and only temporarily. Later this tract of drained land was used during a temporary withdrawal of Mr. Disston as a bait for gullible investors.[19] Nevertheless the trustees conveyed 1,052,711 acres of land to the company, and its successor claims that it is entitled to a conveyance of 347,288 acres more.

Thus, as a result of the policy of drainage by contract with land and drainage companies, not more than 100,000 acres of the swamp lands of Florida were actually made fit for cultivation during a quarter of a century, and then only partially and temporarily. For this comparatively small benefit the state paid an enormous price, since it conveyed away over 10,000,000 acres of land. The failure of this plan of reclaiming the swampy

[15] Trustees of Internal Improvement Fund of Florida, *Minutes of Proceedings*, 7:415-437. For contracts, see pp. 432, 437, 463, 480, 503.

[16] *Ibid.*, 415-437.

[17] *Ibid.*, 102. In a letter from W. S. Jennings, counsel for trustees.

[18] *Ibid.*, 102 *et seq.* and 314-321.

[19] S. S. Lupfer, in *Engineering News*, 54:278-280 (September 14, 1905).

areas of the state led to the inauguration of the policy of land drainage under the direct supervision of the government itself. This was the second plan of reclamation adopted by the Trustees of the Internal Improvement Fund,[20] and its adoption was brought about principally through the efforts of W. S. Jennings, who for a considerable number of years had been general counsel for the trustees.

Until the year 1901 there had been very little public discussion in Florida of its swamp land problem, the grants to railroads and drainage companies arousing little or no comment. But in that year Mr. Jennings was inaugurated as governor and the first step was taken towards really accomplishing something in the work of reclamation. Governor Jennings refused to convey any more swamp lands to the railroads, on the ground that the condition in the grant from the national government to the state to the effect that the lands be drained had not been performed. This precipitated a legal and political fight between the governor and his supporters on the one side, and the railroad companies on the other. Litigation tied the hands of the governor, and prevented the state from doing any work during the term of Mr. Jennings, and he was ineligible for reëlection as the result of a constitutional provision limiting the term of governor to one term. But a successor to the policy of Governor Jennings was elected after a bitter contest with the railroad companies, and the work of reclamation intrusted to a drainage board of which the governor is chairman. This board has authority to lay out drainage districts, and to levy a tax on the lands therein not to exceed ten cents an acre, the receipts therefrom to be used in the work of drainage. A drainage district was at once created to include the Everglades, and a tax of five cents an acre on the swamp lands therein yielded an annual income of more than $200,000 a year. This income still continues, and, together with the proceeds from the sale of some of the state lands, furnishes the means of carrying on the work at the present time. This work is being done by the Trustees of the Internal Improvement Fund and the drainage board, without the use of contractors.[21]

The engineering problem to be solved in the draining of the Everglades is comparatively simple. Someone has said that Lake Okechobee and the Everglades are like a great tank on the top of a gently sloping house roof on the lower edge of which is an elevated rim. If the tank runs over the rim will hold back the water. The tank is the lake, and the rim is composed of a ledge of coral rock; to cut channels through this rock to the sea is to free the land between the ledge and the lake from the excess of water which now renders it unfit for cultivation, and to reclaim the Ever-

[20] Trustees of Internal Improvement Fund of Florida, *Minutes of Proceedings*, 7:415-437.
[21] D. A. Willey, "Draining the Everglades," in *Scientific American*, 104:67-69 (1911).

glades. A system of canals will be opened, but it is not intended to empty Lake Okechobee, whose continued existence is advisable for several reasons. It is an inland sea valuable for purposes of pleasure and of commerce, and its water is needed for canals and waterways and to supplement the rainfall.[22] At the present time several large dredges are at work cutting ditches and canals, and the state is making real progress in its reclamation work.

The question may well be asked as to what these drained lands are really worth after they have been made fit for cultivation. It is difficult to secure accurate estimates. Those interested in the work have stated that the lands are worth one hundred dollars an acre or more, while others say that such statements are absurd.

In 1913 the United States investigated the subject, but for some reason the Senate document[23] which was printed as a result was more in the nature of an advertising prospectus for a real estate company than an unbiased or scientific statement of facts.[24]

In Louisiana there were originally about 10,000,000 acres of swamp lands, comprising nearly one third of the total area of the state.[25] Although the lowlands in the northern part of Louisiana could be drained by the comparatively simple process of building ditches and levees, yet along the seaboard there is a vast tidal marsh which is inundated when hurricanes sweep across the Gulf, and so low that great dykes similar to those of Holland would have to be built in order to wall out the waters of the sea. Because of the difficult engineering problems to be solved in the draining of these coast-line swamps, and the proportionately large amount of overflowed lands in the state, Louisiana was confronted with a vast engineering and financial problem that would have been hard to

[22] T. E. Will, in *Review of Reviews*, 66:451-456 (October, 1912).

[23] 62 Congress, 1 session, *Senate Document 89*.

[24] H. P. Willis, "The Everglades," in *Collier's*, 49: 15, 16 (March 30, 1912). *Senate Document 89* was well illustrated with reproductions of photographs purporting to show scenes on reclaimed lands in the Everglades; it later developed that some of these pictures were of lands far from the saw-grass marsh lands of the glades, and in particular two, entitled respectively "A Nine-Year-Old Orange Grove on Drained Saw-Grass Marsh," and "Harvesting Sugar Cane, St Cloud Plantation."

The use to which the document was devoted by enterprising sellers of Florida lands is illustrated by the following circular:

"Business Opportunity—United States Official Indorsement

First time in the history of the Government that such a thing has been done. The Sixty-second Congress has recently issued a document of 208 pages indorsing the great reclamation, climate, healthfulness, and fertility of the Everglades. The greatest opportunity of the century is offered here to the man with small capital to establish himself where the evident coöperation of the Government is sufficient to make the community rich and prosperous.

Free literature. Call for some. Everglades Land Company."

Other authorities on Florida are: N. P. Broward, "Draining the Everglades," *Independent*, 64: 1448-1449; N. P. Broward, "Homes for Millions: Draining the Everglades," *Collier's*, 44:19; Richard Hargrave, Address before the National Drainage Congress, New Orleans, 1912.

[25] *World Almanac*, 1914, p. 690, gives the area as 48,720 square miles.

solve even had the state acted with much more wisdom and foresight than it did.

As it is this state was seriously handicapped in its drainage work by two things: (1) a lack of adequate drainage laws, and (2) the sale of the swamp lands for practically nothing. How much these lands have really brought the state it is impossible to tell. In 1902 some of these lands were sold by the commonwealth for twelve and one-half cents an acre, which was just twelve and a half times as much as the state had received for similar lands a few years earlier; and in 1903 the price was raised to twenty-five cents an acre. Not only was much of the overflowed surface of Louisiana sold for a mere trifle to individuals and private corporations, but many thousands of acres were turned over to the various levee boards who sold them outright instead of securing their reclamation.[26] Consequently Louisiana to-day owns very little of the swamp land within its borders, and its drainage problem is greatly complicated because of a lack of funds for reclamation work, and the opposition of some of the large landowners of the state.[27]

Furthermore it is only recently that Louisiana has secured a general drainage law that is satisfactory. Under the constitution of 1868 there was no limit to the authority of the minor political subdivisions of the state to incur debts and issue bonds, and, as a result, every parish and municipality became heavily indebted during the reconstruction period. During the reaction following the assertion of white domination, constitutional conventions placed such severe restrictions upon the power of municipal corporations and of parishes to incur indebtedness that works of internal improvement were rendered impossible. But in 1898 a constitutional change authorized the issuing of bonds for the construction of drains and other public improvements,[28] and at almost every session of the legislature the power of drainage districts has been increased, so that at the present time at least the laws do not hamper reclamation work in Louisiana.[29] But this delay, coupled with the state's sale of its swamp lands for insignificant sums, was very costly to it, for the commonwealth has reclaimed but 120,000 acres of the overflowed lands within its borders.[30] Although the second state in the Union with respect to the amount of wet lands fit for drainage granted to it by the federal government, Louisiana ranks very low as to reclamation work accomplished.

Practically all of the 2,700,000 acres of swamp lands in Georgia is still

[26] Letter to the writer from John A. Kinze.

[27] Matthews, *Conservation of Water*, 168-170.

[28] Constitution of 1898, Article 281.

[29] *Laws*, 1910, Acts 197; 256; 317. Address of Judge R. E. Milling before the National Drainage Congress, New Orleans, 1912.

[30] 60 Congress, 1 session, *Senate Document 443*, 8.

unreclaimed and unfit for cultivation. This constitutes approximately one fourteenth of the area of the state. A large part of this land is included in the Okefinokee Swamp, its name being the Indian equivalent for the words "trembling earth."[31] In the winter of 1856-57 Colonel R. L. Hunter, who was employed by the state, ran a line of levels around the swamp for the purpose of determining the practicability of draining it, but his report and maps were lost during the Civil War and not found again until 1875, when the State Geological Survey and the Atlanta Constitution coöperated in several expeditions systematically to explore the swamp with a view to its ultimate drainage.[32]

In 1889 the legislature sold to the Suwanee Canal Company that part of the swamp which belonged to the state for twenty-six and one-half cents an acre, the total area sold being 380 square miles, or approximately 243,200 acres. The plan of the company was to cut ditches and use them to get out the large amount of cypress and other valuable timber which the swamp was known to contain and then to use these ditches for draining the land for agricultural purposes. A canal forty-five feet wide and six feet deep was cut into the swamp for a distance of twelve miles and large quantities of timber taken out, but operations were discontinued before the canal was sufficiently completed to have any effect in draining the swamp. The successors in interest of the Suwanee Company in the last two or three years have been continuing the work in the northwestern part of the swamp, but only for the purpose of cutting and removing timber. No action was taken by the state after the surveys of 1875 until 1894, when the law establishing the Geological Survey was amended so as to make it the duty of the State Geologist to survey swamp lands and prepare plans and estimates of the cost of draining them, but through lack of appropriations to carry on the work not very much was accomplished.[33]

For several years prior to 1911 there had been some agitation for drainage legislation in Georgia, but this movement was spasmodic and unproductive of results until that year, when a general drainage act was passed which will enable landowners to carry out large coöperative drainage projects.[34] Because of the comparatively recent enactment of its drainage

[31] The small islands dotting the swamp are generally surrounded by a floor of moss, which is usually firm enough to hold a person's weight, but it rises and falls for a distance of from ten to twenty feet, hence the name. (Report of Dr. Little of Georgia Geological Survey. Published in *Handbook of Georgia* by the Commissioner of Agriculture of Georgia, 1876.)

[32] R. M. Harper, "Okefinokee Swamp," *Popular Science Monthly*, 74:596-614 (June, 1909). During the Civil War deserters from the Confederate Army lived for a considerable time on "Soldier Camp Island." Paul Fountain described Okefinokee in his *Great Deserts and Forests of North America*, but it is doubtful if he ever saw it himself. *Ibid.*, 598.

[33] Geological Institute of Georgia, *Bulletin* 25, 1911, pp. 14-19; R. T. Nesbitt, *Georgia, Her Resources and Liabilities* (published by the Georgia Department of Agriculture, 1906).

[34] L. R. Atkin, President of the Georgia Drainage Congress, in an address before the National Drainage Congress, New Orleans, 1912.

laws, Georgia, however, has done practically no work whatever in the direction of reclaiming the 2,700,000 acres of swamp land within its borders.[35]

There were, originally, 4,421,000 acres of swamp land in Illinois.[36] These were typical glacial swamps, the water having settled in pot holes and depressions made by the Canadian glacier which once covered Illinois and the surrounding states. The people of Illinois were quick to seize their opportunities for profitable drainage work, and in the constitution of 1870 they authorized the general assembly to pass laws "permitting the owners or occupants of land to construct drains and ditches for agricultural and sanitary purposes across the lands of others."[37] In 1871 the legislature of Illinois passed the first of a series of drainage laws which have been copied in many other states,[38] and which have enabled landowners to coöperate in removing the surplus water from over 3,496,000 acres of the swamp lands of Illinois.[39]

A river and lakes commission was appointed under an act of July 1, 1911, one of its duties being the collection and publication of drainage data. Its investigators and other men interested in the question have estimated that the drainage districts of Illinois have done their work at an average cost of approximately fifteen dollars an acre.[40] At the present time the work is being carried on in 800 drainage districts, with an aggregate area of 12,000 square miles. There are several large projects now well under way, such as Lower Salt Fork Drainage District covering 168,000 acres and calling for 23 miles of ditch and 525 miles of road, and another for 110,000 acres and 55 miles of levee.[41] None of the work which is being done at the present time will bring anything into the state treasury, since

[35] 60 Congress, 1 session, *Senate Document 443.*

[36] *Ibid.*

[37] Constitution of Illinois, Article IV, section 31.

[38] Act of April 24, 1871, entitled "An Act to provide for the construction of drains, levees, and other works." For a survey of decisions of the supreme court of Illinois relating to the constitutionality of Illinois drainage statutes, see Association of Drainage and Levee Districts of Illinois *Annual Report,* 1911, pp. 60-65. As to the effect of drainage legislation in Minnesota, see Illinois Geological Survey, *Bulletin* 8. ch. 5.

[39] 60 Congress, 1 session, *Senate Document 443.* The Rivers and Lakes Commission makes an estimate of 2,571,437 acres (letter to the writer from Secretary Robert I. Randolph).

[40] Robert I. Randolph in a letter to the writer in 1913. "Total assessment for 2,571,437 acres which the Rivers and Lakes Commission has located as being in organized drainage districts amounts to $27,636,583. Average assessment an acre is $10.75."

J. J. Harman, of Harman Engineering Company, in a letter to the writer in 1913. "Reclamation cost per acre of the various drainage districts has varied greatly, depending on the size of the districts, the amount of hill water to be taken care of, and the general type of construction. Cost is from $10 to $12 as minimum to $70 to $80 as maximum; perhaps the average price has been about $25 to $30 per acre."

P. R. Kellar, Secretary of the National Executive Committee of the National Drainage Congress, in a letter to the writer December 24, 1912. As to work done, see also Illinois Association of Drainage and Levee Districts, *Bulletin* 4.

[41] Robert I. Randolph in address at the National Drainage Congress, New Orleans, 1912.

none of the swamp lands to be benefited belong to the state. All of the overflowed lands in Illinois have passed into the hands of individuals or of private corporations.[42]

Although only two other states in the Union contain more swamp lands than Mississippi, yet that state has done very little to reclaim the wet wastes within its borders, which still comprise about 5,760,200 acres.[43] Many of these lands are situated along the river deltas and require the building of levees and in many cases of pumping stations. It is estimated that 3,000,000 acres of land in Mississippi are permanent swamp; the remaining 2,760,200 acres are only periodically overflowed.[44] In 1907, state and federal engineers made a coöperative survey of lands in the Upper Yazoo Delta, containing 208,726 acres of land, and reclamation work there is now under way.[45]

Arkansas is the fourth state in the Union with respect to the amount of its swamp lands. It has 5,911,300 acres.[46] Much of this land requires the building of levees along streams flowing into the Mississippi, the banks of which are periodically overflowed. The largest swamp in the state is the St. Francis swamp, which extends into Missouri. These lands were covered with a comparatively heavy growth of hardwood timber—oaks, immense cypresses, hickories, and gum trees, which originally constituted one of the most magnificent resources of the Mississippi Valley. But instead of following the wise policy of draining these lands itself, and then selling them at advanced prices, Arkansas disposed of them for a song. Many thousands of acres were sold at fifty cents an acre to companies interested in the hardwood trade; and even after enough levee work had been done in other states to demonstrate the profitableness of drainage, that is, as late as 1893, the state was still selling large areas of the bottom lands along the St. Francis at one dollar an acre. As a result of this prodigal policy of the state practically all of the swamp lands in Arkansas are now privately owned.

Though the state owns no swamp lands itself, yet a considerable amount of work has already been accomplished in protecting the bottom lands by levees,[47] and land which formerly sold for one dollar an acre has risen in value to twenty dollars when partly drained, and to one hundred dollars when timber and water were finally removed, the timber meanwhile yielding from fifteen to twenty dollars an acre. A drainage act passed in 1909

[42] Letters to the writer cited in note 40, page 27.

[43] 60 Congress, 1 session, *Senate Document 443.*

[44] 60 Congress, 1 session, *Senate Document 151,* vol 7.

[45] 60 Congress, 1 session, *Senate Document 443.*

[46] *Ibid.*

[47] Matthews, *Conservation of Water,* 158-168. It is estimated that in Missouri and Arkansas $6,000,000 has been invested in levees. Of this amount the federal government has paid $2,000,000 for benefits to navigation.

was amended in 1911. The laws seem to be satisfactory and there are projects now under way which will result in reclaiming approximately 1,000,000 acres.[48]

Most of the 2,789,600 acres of swamp in Missouri were timber-covered bottom lands similar in character to those of Arkansas. Like the latter state, Missouri has followed the policy of selling these state lands at ridiculously low prices, chiefly to hardwood lumber companies. Thus, as late as 1870 or 1880 large tracts of land in the southeastern part of the state were sold for a few cents an acre; and in 1868, 800,000 acres of swamp land which has now been reclaimed and at the present time is worth from sixty to one hundred dollars an acre, was sold for $663.95.[49]

Reclamation work in Missouri first began in the southeastern part of the state, when the situation became so bad as to make hundreds of miles of highways impassable, and to cause the railroads great difficulty in maintaining their trackage. The fact that practically all of the state lands had been sold was somewhat of a handicap in carrying on drainage work, yet the Missouri laws were so well drawn[50] that the work was made much easier than it has been in other states with less practicable statutes; and a considerable amount of land has already been reclaimed. Although what may be called the "drainage period" of the state did not begin until about 1900, yet up to 1912, 191,698 acres had been reclaimed. Crops are being raised on over half of this reclaimed land, and the value of the agricultural products of the state increased by $5,958,990 a year.[51]

The success of completed work has caused the drainage movement in Missouri to spread rapidly and work is now being planned which will cost considerably more than $7,000,000 and reclaim 927,040 acres. These projects are of varying character as to size and point of development, running from mere talk as to the reclamation of 1,600 acres in one county (Jackson County) to the stupendous project of the Little River District, which has been in progress of organization for over eight years. This district has been incorporated, the surveys completed, plans made, and contracts let. The work will require the dredging of 700 miles of ditches, the construction of 40 miles of levee, and the expenditure of $4,880,000, but it will reclaim 530,000 acres of land. When the movement for the organization of this district was begun, the land therein was valuable only for uncut timber or speculative purposes and sold at from one dollar and twenty-five cents to five dollars an acre. It is now selling at prices ranging

[48] Act 279 of 1909, Acts 136 and 221 of 1911; declared constitutional April 1, 1912 in Lee Wilson and Company *v.* Compton Bond and Mortgage Company. The Morgan Engineering Company is now draining 731,000 acres in Arkansas (Circular, 1912).

[49] Missouri Bureau of Labor Statistics, *Supplemental Report*, 1910, p. 10.

[50] The model law suggested by the National Drainage Congress is the same as that of Missouri except for minor changes.

[51] Missouri Waterways Commission, *Bi-annual Report*, 1912, p. 27.

from eighteen to twenty dollars, even though far from railways, uncleared, and undrained.[52] In spite of the fact that nearly 2,000,000 acres of the swamp lands of Missouri have already been reclaimed, there still remain approximately 1,500,000 acres which need draining; but there is no doubt that much of this work will be done in the not-far-distant future.[53]

The 2,748,160 acres of swamp land[54] in North Carolina are of three kinds: (1) heavily timbered gum and cypress swamp in the eastern part of the state, (2) open marsh which has little timber and is too wet even for grazing, but productive of good crops when thoroughly drained and limed, (3) poorly drained cleared land which has been under cultivation for one hundred years; this land produces a good crop one year, but may be profitless for the next three years because of inadequate drainage.[55]

Although the feasibility of reclaiming the wet areas of the state had been discussed pro and con for over fifty years, it was not until 1908, when the North Carolina Drainage Association was organized, that any definite steps were taken toward actually doing any work. Up to that time land drainage had been hindered by the lack of any law which would enable landowners representing a majority of the area of a given swamp district to build ditches over the objection of a small minority of landowners, or to finance any works, by the issuing of bonds. This first convention of the drainage association adopted a resolution endorsing a drainage bill, and, as a result, the legislature of 1909 passed a general act authorizing the formation of drainage districts and the issuance of bonds by them.[56] Since the passage of this act a surprising amount of work has been inaugurated. Fifty-three drainage districts have been organized, embracing over 700,000 acres of overflowed land. None of these lands, however, belong to the state.[57] Of course reclamation work in North Carolina was started so recently that so far very little work has been fully completed, but several ditches are now under construction, and the work is being pushed with vigor.

South Carolina has not drained any of its 3,122,120 acres of swamp land, but the legislature has recently passed several good drainage laws,

[52] *Ibid.*, 13-28.

[53] *Ibid.*, 23. 60 Congress, 1 session, *Senate Document 443*, has the following estimate: original area of swamp lands in Missouri 2,789,600 acres: 350,000 drained; balance undrained, 2,439,600. The above figures, from estimates in the report of the Missouri Waterways Commission, would give a total for original swamp land area of 3,500,000 acres. The discrepancy is probably due to the fact that the commission had more accurate data, and included in its estimate much land that is only flooded infrequently.

[54] 60 Congress, 1 session, *Senate Document 443;* North Carolina Drainage Association, *Proceedings*, 1909, p. 25.

[55] J. O. Wright in *Ibid.*, 11, 12.

[56] North Carolina, *Laws*, 1909, ch. 442; 1911, ch. 67 and 177. Bond issue under laws held valid in 152 *North Carolina*, 738.

[57] North Carolina Drainage Association, *Proceedings*, 1909, p. 7; *Ibid.*, 1911, pp. 5-8; letter to the writer from J. H. Pratt, State Geologist of North Carolina, November 17, 1912.

drainage districts have been organized,[58] and ditches are being cut through the sandy and peaty bogs which for a century have been malaria-breeding swamps.

Michigan has reclaimed 1,600,000 out of the 4,547,439 acres of overflowed lands within its limits; the state has yet to drain approximately 3,000,000 acres.[59]

No drainage projects have been taken up by the commonwealth, except that the legislature has passed laws enabling landowners to construct ditches under the drain commissioners.[60] Most of the southern counties now have reclamation projects under way, and in Bay and Saginaw counties, lands which are overflowed every spring with from three to six feet of water are being drained, levees built, and pumping stations established. There are from 40,000 to 50,000 acres of this land in these two counties alone which will be reclaimed in a few years.[61]

The first comprehensive drainage law in Wisconsin was passed prior to 1891, but it was declared invalid since it did not state that the fact that a drain was of public benefit or utility must be a prerequisite to its establishment. An act of 1891 was upheld, however, and has since then been repeatedly amended.[62] But as a result of the doubtful constitutionality of drainage laws, and the abundance of other good lands in the state, Wisconsin was comparatively slow to start drainage operations on any large scale, and it has reclaimed but 200,000 of the original 2,560,000 acres of swamp lands within its borders,[63] and practically all of this land has been privately owned. About 400,000 acres are now included in drainage districts, and there is more or less work being carried on at this time in the state,[64] but on the whole Wisconsin is not very far advanced in drainage work.[65]

There are 3,420,000 acres of overflowed land in California.[66] Seven hundred thousand acres have already been reclaimed. An area of over 1,000,000 acres lying along the San Joaquin and Sacramento valleys is being drained by building levees and pumping out the waters.[67]

Texas and Alabama have nearly 4,000,000 acres of swamp land, and

[58] 60 Congress, 1 session, *Senate Document 443;* Matthews, *Conservation of Water*, 166; letter to the writer from J. H. Squires, Agronomist of Dupont Powder Company, December 16, 1912.

[59] 60 Congress, 1 session, *Senate Document 443.*

[60] *Drainage Laws of Michigan*, revision of 1911.

[61] Letters to the writer from J. A. Jeffery, of Michigan Agricultural College, April 20, 1912; from J. E. Portér, of Louisiana Golden Meadows Company, December 17, 1912.

[62] Wisconsin, Legislative Committee on Water Powers, Forests, and Drainage, *Report*, January 24, 1910, pp. 37-39.

[63] 60 Congress, 1 session, *Senate Document 443.*

[64] Letter to the writer from E. R. Jones of the University of Wisconsin, April 17, 1912.

[65] Report cited in note 62 *supra.*

[66] 60 Congress, 1 session, *Senate Document 443.*

[67] Matthews, *Conservation of Water*, 170-179; 60 Congress, 1 session, *Senate Document 151*, vol. 7:9.

yet they have made practically no progress in the direction of making them fit for cultivation.[68] Alabama does not even have a general drainage law, and all that has been accomplished in that state has been experimental in character and confined to small tracts owned by individuals.[69]

Swamp land in Indiana has been reclaimed in three ways: (1) by coöperating landowners acting under the general drain laws of the state; (2) by direct appropriation from the state treasury of money to drain especially large areas;[70] (3) by drainage companies such as the Kankakee Valley Drainage Company, which was organized in 1870 but accomplished nothing of importance until 1892.[71]. The work is still being carried on by adjoining owners under the drainage laws, and by private corporations, but all of this land is privately owned.[72] So far Indiana has drained 3,358,000 acres of swamp land.[73]

Virginia had no drainage law until 1910, when an act was passed[74] closely modeled on the North Carolina law of 1909. Several districts have been organized, and there is a project now under consideration to drain part of the Dismal Swamp, but as yet practically no work has been accomplished,[75] and there are 800,000 acres of swamp lands unreclaimed.[76]

Until recently decisions of the supreme court of Tennessee had been against the principle of local taxation for local improvements, and as a consequence no drainage act was possible. A change of position by the court, however, led the way to the enactment of a general drainage statute in 1909, which contained the usual provisions for the assessment of benefits against the owners of lands drained. But as yet almost nothing has been accomplished beyond the making of plans and the bare commencement of drainage operations.[77]

In South Dakota there never has been a very large amount of swamp land. And in that state the drainage question is not so important now as it was a few years ago. This is true because a considerable portion of the land has already been reclaimed through county commissioners under laws

[68] 60 Congress, 1 session, *Senate Document 443;* Alabama, 1,479,200 acres; Texas, 2,240,000 acres.

[69] Letters to the writer from J. F. Duggar, of the Alabama Experiment Station, April 1, 1912, and J. C. Cheney, Chief Clerk of the Department of Agriculture and Industries of Alabama, December 16, 1912.

[70] Alabama Experiment Station, *Circular* 80, 7. Thus the legislature appropriated $65,000 in 1889.

[71] *Ibid.*

[72] Letter to the writer from A. T. Wiancko, of the Agricultural Experiment Station of Purdue University, April 18, 1912.

[73] 60 Congress, 1 session, *Senate Document 443.*

[74] Ch. 159 of Act of March 12, 1912, amends the Act of March 17, 1910.

[75] W. W. Old, Jr., in address at the Drainage Convention of the Southern Commercial Congress, Nashville, Tennessee, April 8, 1912.

[76] 60 Congress, 1 session, *Senate Document 443.*

[77] Tennessee, State Geological Survey, *Annual Report,* 1910, *Press Bulletin* 9, 45; *ibid., Bulletin* 3.

as amended in 1909; and because a heavy drought for the last few years has greatly decreased the need for drainage. Although petitions have been filed with the state engineer calling for the drainage of over 365,000 acres by means of 476 miles of main ditches in 27 counties in the eastern part of the state, yet the work is merely in its preliminary stages.[78]

In Iowa there has been a very large amount of drainage work accomplished, but information in detail is not available.

Utah, Oklahoma, Colorado, Montana, and Wyoming have drainage laws, but they were adopted only recently, and the work done in these states is comparatively insignificant in amount.[79]

From the preceding review of the progress of swamp land reclamation in states other than Minnesota, it is clear that in practically no state has the condition in the federal swamp land grant to the effect that the proceeds from the overflowed lands be used for their drainage, been performed. Thus, Florida conveyed most of the lands granted to it to railroads and to drainage companies which accomplished very little. Arkansas and Louisiana sold their overflowed land at prices ranging from one cent to one dollar an acre and Missouri did little better. In very few of the states is swamp land still owned by the states.[80] The greatest amount of reclamation work has been done in Minnesota, Illinois, Iowa, Indiana, and Michigan. About one sixth of the original swamp land area of the United States has now been drained. Those states which have a considerable amount of overflowed lands within their borders, but have only recently commenced the work of making them fit for cultivation, and which at the present time have the greatest amount of drainage work yet to be done are Florida, Louisiana and Arkansas. Michigan and Minnesota have done much, but they still have a great deal to do.[81] There are at this time in the United States about 80,000,000 acres of swamp lands yet unreclaimed.

[78] State Engineer of South Dakota, *Biennial Report*, 1911-1912, pp. 163, 164. Letter to the writer from A. B. McDaniel, of the University of Illinois, formerly of South Dakota, December 18, 1912.

[79] 60 Congress, 1 session, *Senate Document 443.*

[80] Van Hise in his *Conservation of Natural Resources*, 334, estimates that approximately ninety-five per cent of the swamp lands granted to the states by the federal government have passed into private hands.

[81] See 60 Congress, 1 session, *Senate Document 443.*

CHAPTER IV

DRAINAGE LEGISLATION AND ADJUDICATION

Thirty-six states of the Union have now enacted general drainage laws for the purpose of providing the legal machinery which is necessary if drainage work involving any considerable amount of land is to be successfully carried on.[1] These laws apply to lands which can not be drained or protected from overflow by their owners without building ditches across the lands of others, so that it becomes necessary to provide a system of procedure that will enable the more enterprising proprietors to coöperate in draining their farms without being blocked in their efforts by a small minority who refuse to allow ditches to be built across their lands. These laws also aim to insure adequate drainage outlets, remuneration for property taken or injured for the common good, and an equitable distribution of the costs of the work.

In the constitutions of some states the legislatures have been expressly granted the power to pass such acts;[2] but even in the absence of express constitutional authorization to the legislatures, the courts have quite generally sustained such statutes as a valid exercise of the police and taxing powers, and of the power of eminent domain.[3] Of course the taking[4] or injuring of the private property of the non-consenting or objecting landowners under the power of eminent domain, would be unconstitutional and unlawful, unless the purpose of the work to be done were public in character;[5] and it is for that reason that most of the general drainage laws now in force expressly state that, as a condition precedent to the establish-

[1] 60 Congress, 1 session, *Senate Document 438*, 5, gives 23, but since then laws have been enacted in Georgia, Wyoming, Virginia, and other states. (See Appendix 2.)

[2] Constitution of Iowa, and especially constitution of Illinois of 1870, art. iv, sec. 31, as amended in 1878; constitution of Florida of 1887, art. xvi, sec. 28; constitution of New Mexico of 1911, sec. 186. See also discussion of Louisiana statutes in Appendix 2.

[3] Duke *v.* O'Bryan, 100 *Kentucky*, 710 (1897); Lien *v.* Norman County, 80 *Minnesota*, 58 (1900); In re Drainage Application, 35 *New Jersey Law*, 497 (1872); Sessions *v.* Crinkilton, 20 *Ohio State*, 349 (1870); Bryant *v.* Robbins, 70 *Wisconsin*, 258 (1887); Wurts *v.* Hoaglund, 114 *United States*, 606 (1885); Donnelly *v.* Decker, 58 *Wisconsin*, 461 (1883); Zigler *v.* Menges, 121 *Indiana*, 99 (1889); Gifford Drainage District *v.* Shroer, 145 *Indiana*, 572 (1896); 14 *Cyclopedia of Law and Procedure*, 1025; Freund, *Police Power* (ed. 1904), sec. 127.

[4] Digging of ditches is a "taking" of land. Mills, *Eminent Domain*, sec. 20; Smith *v.* Gould, 61 *Wisconsin*, 31 (1884); Donnelly *v.* Decker, 58 *Wisconsin*, 461 (1883); In re Theresa Drainage District, 90 *Wisconsin*, 301 (1895).

[5] Coster *v.* Tidewater Company, 18 *New Jersey Equity*, 54 (1866); Reeves *v.* Treasurer, 8 *Ohio State*, 333 (1858); Gilbert *v.* Foot cited in 5 *Barbour's New York Supreme Court*, 474, 483 (1849); Jenal *v.* Green Island Drainage Company, 12 *Nebraska*, 163 (1881); Duke *v.* O'Bryan, 100 *Kentucky*, 710 (1897); Fleming *v.* Hull, 73 *Iowa*, 598 (1887).

ment of any ditch or drain or the assessment of any damages or benefits, the work must have been found to be of general utility, or conducive to the public health or welfare.[6] Statutes have been held invalid because not requiring the public purpose to appear, even although they provided for full compensation to the owner of the lands across which the ditches were to be constructed.[7] Of course it is clear that mere payment for property taken is not sufficient; it must never be for a private purpose. Thus, the supreme court of Wisconsin has held that a statute authorizing drains for agricultural, mining, or sanitary purposes, without requiring it to be necessary or desirable to promote any public interest, convenience, or welfare, is not valid. The court, after pointing out that the word "sanitary" in the act did not import the idea of public health, said: "No doubt such an improvement may be useful to some, or perhaps many, private owners of land, by way of increasing the usefulness and value of their lands. But that is merely a private advantage. It interests the public only indirectly and remotely, in the same way and sense in which the public interest is advanced by the thrift and prosperity of individual citizens. But one man's property can not be taken to make another man's home more cheerful or healthful. It is only when it will make the homes of the public more healthful, that any man's property can be taken for sanitary purposes."[8] And private property can not be taken for reclamation works merely because of convenience to the majority of landowners or to the public; if the object can be accomplished practically as well in some other way, the land of the individual can not be taken from him for use as a right of way against his will.[9]

In passing upon the constitutionality of drainage laws there has been some difference of opinion among the courts as to what is a public purpose. Some courts have held that in order to make the purpose public, the drain must be necessary to preserve the public health. Thus, the su-

[6] For example, Minnesota, *Laws*, 1905, ch. 230, sec. 10; *General Statutes*, 1913, sec. 5532. And most acts provide that they shall be liberally construed so as to promote public health, etc. See Minnesota, *Laws*, 1905, ch. 230; Idaho, *Session Laws*, 1913, ch. 16, sec. 40; Kansas, *Laws*, 1911, ch. 168, sec. 37; Kentucky, *Acts*, 1912, ch. 132, sec. 49; Mississippi, *Laws*, 1906, ch. 132, sec. 30.

[7] In re Theresa Drainage District, 90 *Wisconsin*, 301 (1895).

[8] *Ibid.* So in McQuillon *v.* Hatton, 42 *Ohio State*, 202 (1884) the court said: "The use that will justify the taking of private property by the power of eminent domain, is the use by or for the government, the general public or some portion of it; and not the use by or for particular individuals, or for the benefit of certain estates. The use may be limited to the inhabitants of a small locality, but the benefit must be in common and not to a very few persons or estates. The prosperity of each individual conduces, in a certain sense, to the public welfare, but this fact is not a sufficient reason for taking other private property to increase the prosperity of individual men. The draining of marshes and ponds may be for the promotion of public health and so become a public object; but the draining of farms to render them more productive is not such an object. . . . . The mere fact that the proposed ditch would enable the parties to raise more or larger crops, did not authorize a verdict in favor of establishing the ditch."

[9] Rice *v.* Wellman, 5 *Ohio Circuit Court*, 334; Caldwelt *v.* Harrison Township, 2 *Ohio Circuit Court*, 10; 6 *American and English Encyclopaedia of Law* (1st ed.), 515.

preme court of Michigan, in the case of Kinnie *v.* Bare[10] said: "Drain laws which take from the citizen his private property against his will, can be upheld solely upon the ground that such drains are necessary for the public health. They proceed upon the basis that low, wet, and marshy lands generate malaria, causing sickness and danger to the health and life of the people; that when they are of such character as to injure the health of the community, they become and are public nuisances, which ought to be abated, and the Legislature have the right, under the police power inherent in every government, to protect the people from plague and pestilence, and to preserve the public health. But drainage for the purpose of private advantage, such as improving the quality of the land, or rendering it more productive or fit for cultivation, can not be justified under the police power. Neither public convenience nor public welfare, independent of considerations of the public health, will justify the Legislature in the enactment of laws 'for the construction and maintenance of drains, and the assessment of taxes therefor'. It is evident that, where the public health is not affected by the existence of low, swamp lands, the only object to be accomplished by their drainage is the improvement of the land itself." This principle to the effect that private property can not be taken for a right-of-way for a drainage ditch unless it is found that the lands to be drained are a source of disease, and that the draining of them will promote the public health, was enforced in New York prior to 1895.[11]

Other courts have adopted a more liberal policy and have held that the purpose of a work of land drainage is public if it involves sufficiently large tracts of land. Thus the supreme court of Massachusetts, in affirming the validity of a statute providing for the draining of certain lands along a river by the removal of a dam therein, against the objection that its purpose was not public, said: "The improvement of so large a territory, situated in several different towns and owned by a great number of persons, by draining off the water and thereby rendering the land suitable for tillage, which could not otherwise be usefully improved at all, would seem to come fairly within the scope of legislative action, and not to be so devoid of all public utility and advantage as to make it the duty of this court to pronounce a statute, which might well be designed to effect such

[10] 68 *Michigan*, 625, 628 (1888).

[11] Re Draining in Chili, 5 *Hun's New York*, 116 (1875); Re Ryers, 72 *New York*, 1 (1878); Burk *v.* Ayers, 19 *Hun's New York*, 17 (1879); Catlin *v.* Munn, 37 *Hun's New York*, 23 (1885).

Where proceedings were started in 1891 but not found to be for public health, the court held the ditch illegal on the ground that such finding was necessary, and that ch. 384 of the Laws of 1895, passed in pursuance of the amendment of January 1, 1895 as art. 1, sec. 7 of the constitution, and that amendment, were not retrospective in effect. The amendment was as follows: "General laws may be passed permitting the owners or occupants of agricultural lands to construct or maintain for the drainage thereof, necessary drains, ditches, and dykes upon the lands of others, under proper restrictions and with just compensation, but no special laws shall be enacted for such purposes."

a purpose, invalid and unconstitutional. The act would stand on a different ground, if it appeared that only a very few individuals or a small adjacent territory were to be benefited by the taking of private property. But such is not the case here. The advantages which may result from the removal of the obstruction caused by the plaintiff's dam are not local in their nature, nor intended to be confined to a single neighborhood. They are designed to embrace a large section of land lying in one of the most populous and highly cultivated portions of the State, and by increasing the productive capacity of the soil to confer a benefit, not only on the owners of the meadows, but on all those who will receive the incidental advantage arising from the development of the agricultural resources of so extensive a territory."[12] It has been held in New Jersey that the purpose of draining large districts of land lying within several counties of the state, embracing thousands of acres, is sufficiently public to justify the exercise of the power of eminent domain,[13] and in Indiana that a ditch will be of public benefit and utility if it will drain any considerable body of lands.[14] In North Carolina the supreme court has decided that an act making possible the drainage of thousands of acres of land located in a low portion of the state must be deemed of general and public utility.

Some of the courts have not limited the right to exercise the power of eminent domain for reclamation work to cases where large tracts of land are involved, but have held in effect that the amount of land to be benefited is not a proper test in determining whether or not the purpose of the work is public. Thus, the supreme court of North Carolina, at first holding that the amount of land involved was material,[15] in a later case said: "If the General Assembly has power to make regulations for draining a swamp containing 10,000 acres, it has the same power in regard to a swamp containing 1,000 acres. So of 100 acres, so of one acre. There is no distinction in the principle; the only difference is in regard to the degree."[16] The supreme court of Montana, in considering the validity of a law providing for the condemnation of a right of way for an irrigation ditch (the situation being analogous to that in drainage matters), said: "What real distinction is there, so far as the term 'public use' is concerned, between the benefit that results to a state from the reclamation by artificial irrigation of 160 acres of agricultural land owned by one or two persons, and the reclamation by the same means of thousands of acres owned by many different persons living together in one subdivision of the

[12] Talbot *v.* Hudson, 16 *Gray's Massachusetts*, 417, 424 (1860).

[13] Re Drainage between Lower Chatham, 35 *New Jersey Law*, 497 (1872); Re Drain on Pequest River, 39 *New Jersey Law*, 433 (1877); Tidewater Company *v.* Coster, 18 *New Jersey Equity*, 518 (1866).

[14] Zigler *v.* Menges, 121 *Indiana*, 99 (1889).

[15] Norfleet *v.* Cromwell, *supra*.

[16] Pool *v.* Trexler, 76 *North Carolina*, 297 (1877).

state? We do not think there is any in principle. The reclamation of one small field by means of artificial irrigation promotes the development and adds to the taxable wealth of the state as well as the reclamation by the same means of a number of fields. The only difference is the extent of the benefit."[17] In Washington it has been held that the construction of ditches for the drainage of land otherwise useless for agricultural purposes is a public one; and that it is not necessary that the public at large shall be benefited, but only that part of the public affected by want of proper drainage or by the improvement to be made.[18]

Although the prosperity of individuals may conduce to the welfare of the state, the courts have never considered the promotion of individual welfare as constituting a public purpose in connection with the exercise of the power of eminent domain.[19] Consequently courts sustaining drainage acts under that power have encountered difficulties when but small tracts of land were benefited or a few individuals and have evidently considered it easier to justify such laws by a reference to the broader and more indefinite police power.[20] Thus, the supreme court of North Carolina said: "The Legislature, in the exercise of the police powers of government, had authority to enact it (the drainage law) with a view to the promotion of the general welfare, and the mere fact that one or more individuals may derive from it peculiar and particular benefits and advantages, does not destroy in effect its validity."[21] And in Wisconsin, the court, after referring to the provisions of a drainage statute upon the constitutionality of which it was passing, said: "It requires but a casual examination of these provisions for the draining of the swamp and overflowed lands of the State to be apparent that such ditching and draining are for no public use whatever in the legal meaning of the term. The primary object is solely to restore such lands to a proper condition for tillage and agriculture by the several owners, and for their use alone. It enhances their value, intrinsic and in market. This is the only object which concerns their use, and that use is strictly private. The other object, and the only one mentioned in the law, is that such ditching, draining, and enlargement of drains will 'conduce to the public health or welfare.' It is clear that no private property is authorized by this law to be taken for the *public* use, and that whatever taxation so called or assessment, it is not an exaction of the government for revenue or for any public purpose. It follows that this system of drainage of the lands of private owners by special assessment of all of

[17] Ellinghouse *v.* Taylor, 19 *Montana*, 463, 464 (1897).

[18] Lewis County *v.* Gordon, 20 *Washington*, 80 (1898).

[19] *Supra*, page 34, note 5.

[20] Thus in Cribbs *v.* Benedict, 64 *Arkansas*, 555 (1897), the court said: "For the power of police is more comprehensive in its application, and the limitations upon its exercise are not so imperious and exacting (as of eminent domain)."

[21] Winslow *v.* Winslow, 95 *North Carolina*, 24 (1886).

them proportionably according to their respective *private* benefits, is not within the purview of any provision of the state constitution, and it cannot be sustained thereby. But there is a sovereign power in the State, to be exercised by the legislature which is outside, and in a sense above, the constitution called the *police* power of the State. . . . This legislation may readily be referred to this power by providing for the *public health*. If it were not for this obvious and clearly expressed purpose of the law, it could not be endured for a moment, because it would provide for a despotic and most unwarrantable interference with private property for strictly private *purposes* and *use*, in which neither the people of the State nor the State itself, nor the public, have any interest whatever."[22]

It is clear that the power of police is broader in its scope than that of eminent domain and therefore it is perhaps easier to sustain a drainage statute by a reference to the former emanation of sovereignty than the latter, but even where the act is based upon the police power there must also be a public purpose.[23] The recognition of this fact has caused some courts to use the possible benefit to public highways as one of the grounds for holding drainage laws sufficiently public in purpose to be constitutional.[24] Thus, an Ohio court held that it is not sufficient that a ditch will drain the lands adjacent to it, or enable the owners of adjacent lands to raise larger and better crops, but the public health, convenience, or welfare must in some way suffer for want of the ditch. The public convenience may be subserved by the fact that in times of freshets water which overflows turnpikes and bridges, will be carried away more rapidly and with less injury to such roads and bridges. If the construction of the ditch . . . . will result in the reclamation or bettering of a considerable quantity of low, wet or swampy lands, or drain stagnant ponds, thereby improving the public highways of the vicinity and the health of the community, and increasing the value of the land surrounding the ditch, it will be sufficiently conducive to the public health, convenience, or welfare to be sustained.[25]

It has generally been held that it is not necessary that all the people of the state should be directly affected by the drainage. It is sufficient if a particular community is benefited.[26] Thus, in Lake Erie and W. R. Co. *v.* Hancock County Commissioners, the supreme court of Ohio held that private property may be appropriated for a drainage ditch if it will be conducive to the public health, convenience, or welfare of the neighbor-

[22] Donnelly *v.* Decker, 58 *Wisconsin*, 461 (1883).

[23] Tiedeman, *Limitations on the Police Power*, 444.

[24] Smeaton *v.* Martin, 57 *Wisconsin*, 364 (1883); Heick *v.* Voight, 110 *Indiana*, 279 (1886); Anderson *v.* Baker, 98 *Indiana*, 587 (1884); Coster *v.* Tidewater Company, 18 *New Jersey Equity*, 518 (1866).

[25] Thomas *v.* County Commissioners, *Ohio Circuit and Common Pleas*, 449.

[26] Ross *v.* Davis, 97 *Indiana*, 79 (1884).

hood through which it is constructed, and that a more general necessity is not required.[27] It is the public health of the community to be affected by the proposed work, and not that of the public at large, that is to be regarded in determining the power of the legislature;[28] and that the works authorized to effect the drainage of land do not extend beyond a particular, and it may be a small, district does not prevent the purpose from being public.[29] If the drain is of public benefit, the fact that some individuals may be specially benefited over others affected by it will not deprive it of its public character.[30]

While there seems to be a tendency for the courts to shift the basis of the constitutional right of the state legislatures to enact general drainage laws from the rights of eminent domain and taxation to the broader ground of the police power, where such statutes may be justified because they promote the public benefit, welfare, and convenience; yet even there it is difficult in many cases to find a true public purpose for the acts within the established legal definition of the term "public." The judiciary have seen that drainage statutes are necessary and wise even though in their application to some cases only a few landowners may be benefited and the public benefit be non-existent; that without such laws less progressive landowners, by refusing to allow their more progressive neighbors to build ditches across their lands, could prevent the reclamation of swamps and marshes, and retard the development of the country; and have sustained drainage acts in many cases by referring to possible benefits to public highways, health, or convenience, which are really remote and uncertain, as lending a sufficient public character to justify such laws under the police power; but the public interest is clearly in many cases "rather a specious plea than a reality."[31] In a few instances, however, the courts have practically upheld the statutes by frankly referring to their necessity alone, so far as the real basis of their decisions is concerned. Thus Justice Peckham, speaking of the power of a legislature to authorize the drainage of swamp lands said in a comparatively recent decision: "The power does not rest simply upon the ground that the reclamation must be necessary for the public health. That indeed is one ground for interposition by the State, but not the only one. Statutes authorizing drainage of swamp lands have

[27] 63 *Ohio State*, 23 (1900).

[28] Chesbrough *v.* Putnam, 37 *Ohio State*, 508 (1862).

[29] Hartwell *v.* Armstrong, 19 *Barbour's New York Supreme Court*, 166 (1854); Re Ryers, 72 *New York*, 1 (1878).

[30] Talbot *v.* Hudson, 16 *Gray's Massachusetts*, 417, 425 (1860). "That this statute may be used (and probably is sometimes) for the purpose of promoting private interests in the name of 'public health and convenience', we need not stop to deny. It is enough for us to know that the principal object intended and authorized by the legislature was the public welfare; and that whenever private interests are promoted by the making of ditches, etc., they are merely incidental, when the statute is properly executed." Sessions *v.* Crinkilton, 20 *Ohio State*, 349 (1870). See also Ross *v.* Davis, 97 *Indiana*, 79 (1884).

[31] Freund, *Police Power* (ed. 1904), 469.

frequently been upheld independently of any effect upon the public health, as *reasonable regulations for the general advantage of those who are treated for this purpose as owners of common property.*"[32] And some time before this Judge Cooley had written: "If it be essential or material for the prosperity of the community, and if the improvement be one in which all the landowners have to a certain extent a common interest, and the improvement can not be accomplished without the concurrence of all or nearly all of such owners by reason of the peculiar natural condition of the tract sought to be reclaimed, then such reclamation may be made, and the land rendered useful to all, and at their joint expense. In such case the absolute right of each individual owner of land must yield to a certain extent or be modified by corresponding rights on the part of other owners for what is declared upon the whole to be for the public benefit."[33] In other words, this basis for sustaining drainage laws might be said to be an application in a negative manner of the old maxim, "sic utere tuo ut alienum non laedas."[34] It might well be contended that at least the beginnings have been laid down for a rule to the effect that one should not refuse or neglect to use or improve his own land, when such non-user will prevent others from using or improving their land or property.[35]

It will be noted later that in some of the states on the eastern coast of the United States the drainage laws do not state that they are for a public purpose, nor do they require any finding that a proposed work of reclamation is of public benefit or utility. The courts in these states have therefore been precluded from relying upon even the broadest application of the theory of the police power to sustain their statutes; but the latter were enacted as early as 1701 if not earlier, and were not called in question for such a long period of time that the doctrine of stare decisis could be appealed to as authority for upholding them. It is true that in these cases, as in others where laws authorized the exercise of the power of eminent domain for purposes really private, such courts have sometimes said that such private statutes could not be held constitutional merely because they had been acquiesced in for a great number of years;[36] but nevertheless similar private acts have been declared valid because of the doctrine of stare decisis in many cases, particularly those relating to pri-

[32] Fallbrook Irrigation District *v.* Bradley, 164 *United States*, 112, 163 (1896).

[33] Cooley, *Taxation* (2d ed.), 617.

[34] Note expression of court in Donnelly *v.* Decker, 58 *Wisconsin*, 461, 472 (1883).

[35] This justification of the statutes, and the effect of stare decisis, might perhaps be said to constitute two exceptions to the oft repeated rule that no indirect benefits to the public resulting from a benefit to private persons, can constitute a "public" benefit or purpose in the legal sense of the term. (See following paragraphs on stare decisis.)

[36] Hartwell *v.* Armstrong, 19 *Barbour's New York Supreme Court*, 166, 170 (1854); Sadler *v.* Langham, 34 *Alabama*, 311 (1859).

va'e roads[37] and the flowage of lands for grist mills.[38] Indeed, many statutes providing for the exercise of the power of eminent domain for uses of at least doubtful publicity were enacted by colonial legislatures prior to the American Revolution or the adoption of state constitutions, such as the mill-dam acts of 1667, 1714, 1718, 1719, 1719, 1734, and 1758, in Virginia, Massachusetts, New Hampshire, Delaware, Maryland, Rhode Island, and North Carolina respectively,[39] the private-road acts of 1735-36 in Pennsylvania,[40] and a Tennessee grist-mill law of 1777.[41] Statutes of this character were enacted, and their validity in some cases passed upon,[42] before the adoption of inconsistent provisions in state constitutions. Of course the latter would displace existing conflicting legislation but a retroactive force might be avoided[43] on the theory that, if the people had intended to prevent their legislatures from passing statutes common at the

[37] Hickman's Case, 4 *Harrington's Delaware*, 580 (1847); Palairet's Appeal, 67 *Pennsylvania*, 479 (dictum) (1871); but see Lewis, *Eminent Domain*, sec. 167 and cases cited therein.

[38] Hankins *v.* Lawrence, 8 *Blackford's Indiana*, 266 (1846); Fleming *v.* Hull, 73 *Iowa*, 598, 602 (1887); Burnham *v.* Thompson, 35 *Iowa*, 421 (1872); Olmstead *v.* Camp, 33 *Connecticut*, 532 (1866); McMillan *v.* Noyes, 75 *New Hampshire*, 258 (1909); Miller *v.* Troost, 14 *Minnesota*, 365 (*Gilfillan*, 282) (1869); Fisher *v.* Horicon Iron Company, 10 *Wisconsin*, 351 (1860); Kepley *v.* Taylor, 1 *Blackford's Indiana*, 492 (1819); Todd *v.* Austin, 34 *Connecticut*, 78 (1867); Occum Company *v.* Sprague Manufacturing Company, 35 *Connecticut*, 496, 511 (1868); Boston and Roxbury Mill Company *v.* Newman, 12 *Pickering's Massachusetts*, 467 (1832); Hazen *v.* Essex Company, 12 *Cushing's Massachusetts*, 475 (1853); Murdock *v.* Stickney, 8 *Cushing's Massachusetts*, 113 (1851); Jordan *v.* Woodward, 40 *Maine*, 317 (1855); Great Falls Manufacturing Company *v.* Fernald, 47 *New Hampshire*, 444 (1867); Amoskeag Manufacturing Company *v.* Head, 56 *New Hampshire*, 386 (1876); Ash *v.* Cummings, 50 *New Hampshire*, 591 (1872); Amoskeag Manufacturing Company *v.* Worcester, 60 *New Hampshire*, 522 (1881); Amoskeag Manufacturing Company *v.* Godale, 62 *New Hampshire*, 66 (1882); Head *v.* Amoskeag Manufacturing Company, 113 *United States*, 9 (1885); Scudder *v.* Trenton Delaware Falls Company, 1 *New Jersey Equity*, 694, 726 (1832); Venard *v.* Cross, 8 *Kansas*, 248, 261 (1871); Harding *v.* Funk, 8 *Kansas*, 315, 323 (1871); Traver *v.* Merrick County, 14 *Nebraska*, 327 (1883); Cooley, *Constitutional Limitations* (6th ed.), 657-661; *Angell on Watercourses* (7th ed.), 487; Lewis, *Eminent Domain* (2d ed.), sec. 180 *et seq.*

[39] The following list gives first the year of the adoption of the *earliest state constitution* and the references to mill-dam acts passed prior thereto. For references to other early acts of the same nature, see note to Head *v.* Amoskeag Manufacturing Company, 113 *United States*, 17.

Virginia (1776); *Colonial Statutes*, 1667, ch. 4, *2 Hening's Statutes*, 260; *Colonial Statutes*, 1705, ch. 41, 3 *Hening's Statutes*, 401.

Massachusetts (1780): *Provincial Statutes*, 1714, ch. 15, 1 *Provincial Laws* (State ed.), 729, and *Ancient Charters*, 404.

New Hampshire (1776): *Provincial Statutes*, 1718, *Provincial Laws* (1771 ed.), ch. 60.

Maryland (1776): *Provincial Statutes*, 1719, ch. 15; *Bacon's Laws*, 1765, and 1 *Kilty's Laws*.

Delaware (1776): *Provincial Statutes*, 1719, 1760, 1773, 1 *Laws* 1700-1797, p. 535, app. 53.

Rhode Island (1842): *Colonial Statutes*, 1734; *Laws*, 1744, p. 180; *Public Laws*, 1798, p. 504.

North Carolina (1776): *Provincial Statutes*, 1758, ch. 5, *Revision*, 1773, p. 219.

[40] Palairet's Appeal, 67 *Pennsylvania*, 479 (1871). Act not attacked for 115 years.

[41] Harding *v.* Goodlet, 3 *Yerger's Tennessee*, 40 (1832). New York private road act of 1772 was declared void as conflicting with constitution of 1777 in Taylor *v.* Porter, 4 *Hill's New York* 142 (1843), but Chief Justice Nelson dissented on the ground of stare decisis, saying that the act had not been called in question for over seventy years.

[42] Hepburn's Case, 3 *Bland's Maryland Chancery*, 95; Wilkinson *v.* Leland, 2 *Peter's United States Supreme Court*, 627. Constitution of Rhode Island, 1843. See also Tyler *v.* Beacher, 44 *Vermont*, 648 (1871).

[43] Wilkins *v.* Jewett, 139 *Massachusetts*, 29; 8 *Cyclopedia of Law and Procedure*, 747; 6 *American and English Encyclopaedia of Law*, 919; Cooley, *Constitutional Limitations* (6th ed.), 77; Black, *Interpretation of Laws* (2d ed.), 26.

time of the making of such constitutions, they would have embodied in their organic laws express prohibitions against laws of the character of the private-road and grist-mill acts.[44]

Following decisions upholding private-road and mill-dam acts which had long been acquiesced in and enacted prior to 1800, the supreme court of New Jersey has affirmed the validity of drainage acts of that state which were really private in character. Thus, in the case of Coster *v.* Tidewater Company such a statute was upheld[45] against the objection that it authorized the taking of private property for a private purpose. The court referred its decision to the "power of the government to prescribe public regulations for the better and more economical management of property of persons whose property adjoins, or which, for some other reason, can be better managed and improved by some joint operation, such as the power of regulating the building of party walls; making and maintaining partition fences and ditches; constructing ditches and sewers for the draining of uplands or marshes, which can more advantageously be drained by a common sewer or ditch. This is a well known legislative power," said the court, "recognized and treated by all juriconsults and writers upon law through the civilized world."[46] And in a leading case upon the constitutionality of such drainage acts, the New Jersey statute of March 8, 1871, with its supplement of March 19, 1874, was declared within the sphere of legitimate legislation by the supreme court of that state. This was on the theory that the right of the legislature, though obviously not resting in the powers of eminent domain or of taxation, and derogatory to private property rights by compelling the private owner to suffer, and pay for the improvement of his property because other contiguous owners desired so to improve theirs, and not to be justified on first principles, had nevertheless become established as a sort of local common law by legislative and judicial and popular recognition for nearly a century, and that it must now be regarded as legitimate legislation.[47] This position was affirmed by the United States Supreme Court, which, speaking through Justice Gray, said: "General laws for the drainage of large tracts of swamp and low lands, upon proceedings instituted by some of the proprietors of the lands to compel all to contribute to the expense of their drainage, have been maintained by the courts of New Jersey (without reference to the power of taking private property for the public use under the right of eminent domain, or to the power of

[44] Justice Brewer in Venard *v.* Cross, 8 *Kansas*, 248, 262 (1871).

[45] The act, however, was declared unconstitutional because of an improper method of making assessments.

[46] 3 *C. E. Green's New Jersey Chancery*, 54, 68, 516 (1866).

[47] Hoagland *v.* Wurts, 41 *New Jersey Law*, 175 (1879). Explained and followed in 42 *New Jersey Law* 553; 45 *New Jersey Equity*, 94; 68 *New Jersey Law*, 199; 80 *New Jersey Law*, 268 and 648; 46 *New Jersey Equity*, 441; 65 *New Jersey Equity*, 629. The decision held that the purpose of the act was public, but that it must be considered void because departing from an ancient custom as to manner of making assessments.

suppressing a nuisance dangerous to the public health) as a just and constitutional exercise of the power of the legislature to establish regulations by which adjoining lands, held by various owners in severalty, and in the improvement of which all have a common interest, but which, by reason of the peculiar natural condition of the whole tract, can not be improved or enjoyed by any of them, without the concurrence of all, may be reclaimed and made useful to all at their joint expense. The case comes within the principle upon which this court upheld the validity of the general mill acts in Head *v.* Amoskeag Manufacturing Company, 113 *United States,* 9."[48]

Thus, the constitutional right of the legislatures of the states to enact general drainage laws has been affirmed, and the argument that they authorize the confiscation or taking of private property for private purposes has been refuted by referring to the powers of eminent domain, taxation, and police, the doctrine of stare decisis, and the necessity and wisdom of such statutes as conducive to the improvement of lands by more enterprising owners.

But the constitutionality of such acts has been vigorously assailed in the courts, not only on the ground that their object is merely private gain and therefore that they are beyond the scope of legitimate legislative authority, but also for reasons peculiar to particular statutes or constitutions, such as that the act is defective as to title, superseded by later acts, special legislation, or violating prohibition of state aid to internal improvements. Furthermore, the laws in question have been said to violate constitutional provisions relating to the separation of the powers of government into three distinct departments, executive, legislative, and judicial. Such provisions are common, and it is often further expressly stated in the organic laws of the states that no one of the three departments or its officers shall exercise any of the functions properly belonging to another.[49] The attacks upon drainage statutes on this ground have arisen most frequently in connection with acts requiring or providing for the participation of judicial officers in hearings, their appointment of viewers or commissioners, and the making of ditch orders by them. These attacks have raised two distinct issues. In the first place, the question has arisen as to whether the acts in question really do impose non-judicial duties upon the courts, and thus violate the principle of a separation of powers. And in the second place, it has been necessary for the courts to consider the question as to whether the constitutional provisions relating to distinct departments of government are applicable to such cases as this, that is, to the carrying on of drainage works. These two issues can not well be satisfactorily discussed by a mere reference to drainage cases,

[48] 114 *United States,* 610, 613 (1884).

[49] For example, Minnesota Constitution, art. 3; Alabama Constitution, art. 3, sec. 2; Maine Constitution, art. 3, sec. 1; Michigan Constitution, art. 3, sec. 2; Mississippi Constitution, art. 3, sec. 2.

since they are comparatively few in number, and as a rule are unsatisfactory in their treatment of the subject, so that it will be necessary to refer to some of the broad principles that have been laid down by the courts with reference to the doctrine of the separation of powers in decisions on matters other than the reclamation of swamp lands through public action.

The general principle of law is well established that the legislature can not impose upon the judiciary any duties or confer upon it any powers that are non-judicial in character.[50] The term "judicial power" includes both the power to determine controversies[51] and to interpret laws;[52] and it is to be distinguished on the one side from the power to execute, administer, or enforce, the laws, and on the other side from the power to lay down in advance of the occurrence of the acts to which they relate, general rules of conduct. The legislature is to make the law; the executive, to carry it out; the judiciary, to apply it to particular cases. The fundamental principle of the separation of powers is easily stated; but, as is always the case when the abstract and general is to be applied to the concrete and particular, the courts have met with difficulties in testing the constitutionality of given statutes as to the division of governmental departments. They have been forced to concede that in practice it is not only inadvisable in many cases, but even impossible, to enforce a strictly logical separation of functions.[53] Partly because of this difficulty, and partly because of political reasons or the influence of public opinion, there can not be said to be uniformity in the application of the general rule that non-judicial functions can not be imposed upon the judiciary. In some cases it would seem that the courts have recognized a desire on the part of the people to have certain matters

[50] 8 *Cyclopedia of Law and Procedure*, 844. In Minnesota, see Minnesota Constitution, art. 3, sec. 1; State *v.* Brill, 100 *Minnesota*, 499 (1907); State *v.* Bates, 96 *Minnesota*, 110 (1905); McGee *v.* Hennepin County, 84 *Minnesota*, 472 (1907); State *v.* Crosby, 92 *Minnesota*, 176 (1904); In re Application of Senate, 10 *Minnesota*, 78 (1865); Rice *v.* Austin, 19 *Minnesota*, 103 (1872); State *v.* Young, 29 *Minnesota*, 474, 552 (1881); McConaughy *v.* Secretary of State, 106 *Minnesota*, 392, 414 (1909); State *v.* Dike, 20 *Minnesota*, 363 (1873-74).

[51] Taylor *v.* Place, 4 *Rhode Island*, 324, (1856); Merrill *v.* Sherburne, 1 *New Hampshire*, 199, 204 (1818).

[52] State *v.* Denny, 118 *Indiana*, 382, 388 (1888); Wolfe *v.* McCaull, 76 *Virginia*, 876 (1882); 6 *American and English Encyclopaedia of Law*, 1053.

[53] Goodnow, *Comparative Administrative Law*, 20; Wilson, *Congressional Government*, 285, 306; Stevens, *Sources of the Constitution of the United States*, 47; Von Holst, *Constitutional Law of the United States*, 67, 68; Cooley, *Constitutional Law*, 44; Story, *Commentaries on the Constitution of the United States*, sec. 525; 2 Hare, *American Constitutional Law*, 850; Livingston *v.* Moore, 1 *Baldwin's United States Circuit Court*, 449; Brown *v.* Turner, 70 *North Carolina*, 93, 102 (1874).

In Minnesota the court has held that the exercise of judicial functions may involve the performance of legislative or administrative duties, and vice versa; State *v.* Dunn, 86 *Minnesota*, 301, 304 (1902); Minnesota Sugar Company *v.* Iverson, 91 *Minnesota*, 30, 34 (1903); Rockwell *v.* Fillmore County, 47 *Minnesota*, 219 (1881); Home Insurance Company v. Flint, 13 *Minnesota*, 244 (1862); State *v.* Iverson, 92 *Minnesota*, 355, 362 (1904). See also as to nature of judicial inquiry, Prentis *v.* Atlantic Coast Line, 211 *United States*, 210 (1908); State *v.* Probate Court, 112 *Minnesota*, 279 (1910); and that there are many duties which may be either judicial or ministerial, depending on the officer or body performing them, and the effect to be given to their action or determination, Foreman *v.* Hennepin County, 64 *Minnesota*, 371 (1896).

controlled by a court which they may deem less influenced by partisan or personal motives than the other departments of the government; and in other decisions it would appear probable that the judiciary were merely unwilling to assume additional duties which they might avoid by a more strict application of the doctrine of separation to the facts involved. Cases that may throw some light upon the validity of drainage acts that require action by the courts by parity of reasoning or similarity in facts, are those in which it has been held that judges might be authorized to fix the salaries of deputy county officers;[54] that a county judge can not be endowed with the right of designating the time and place of elections[53] (of interest in reference to laws relating to formation of drainage districts after election on the question); that courts can not exercise the power to create municipal corporations;[56] that they can not be required to pass upon claims in non-judicial proceedings;[57] and, on the other hand, that even the salaries of court reporters can not be fixed by the judges.[58] It has been held that a statute empowering a circuit judge to issue a certificate of incorporation after determining that the proper steps have been taken is valid;[59] and so is one that imposes upon certain judges the duty of fixing the boundaries of a sanitary district.[60] In Minnesota it has been held that a duty may involve the exercise of judicial and legislative or administrative functions so connected that they can not well be separated; that in such cases the legislature in its discretion may impose the duty upon the judiciary, and that the courts will presume that the legislature intended that the duty should be performed in a judicial manner;[61] and statutes have been sustained authorizing the district courts to establish drainage districts[62] and roads;[63] to determine whether assessing officers have correctly determined the facts on which assessments for local improvements are made;[64] to appoint examiners of title under the Torrens law;[65] to fix the salaries of

[54] Stone *v.* Wilson, 19 *Kentucky Law*, 126 (1897).

[55] Dickey *v.* Hurlburt, 5 *California*, 343 (1855).

[56] People *v.* Nevada, 6 *California*, 143 (1850); Shumway *v.* Bennett, 29 *Michigan*, 451 (1874). But as to conflict on this point, see McQuillen, *Municipal Corporations*, secs. 136, 137, 139; Dillion, *Municipal Corporations* (5th ed.), 107 *et seq.;* State *v.* Simons, 32 *Minnesota*, 540 (1884) holds court can not incorporate.

[57] United States *v.* Ferreira, 13 *Howard's United States Supreme Court*, 39 (1851).

[58] Smith *v.* Strother, 68 *California*, 194 (1885).

[59] Elder *v.* Central City, 40 *West Virginia*, 222 (1895); In re Union Mines, 39 *West Virginia*, 179 (1894).

[60] People *v.* Nelson, 133 *Illinois*, 565 (1890).

[61] Foreman *v.* Hennepin County, 64 *Minnesota*, 371 (1896); McGee *v.* Hennepin County, 84 *Minnesota*, 472 (1901); State *v.* Crosby, 92 *Minnesota*, 176, 180 (1904); State *v.* Bates, 96 *Minnesota*, 110 (1905).

[62] State *v.* Crosby, 92 *Minnesota*, 176 (1904) and see p. 56 *infra*. In State *v.* Bates, 96 *Minnesota*, 110, 116 (1905) the court said that when legislative, executive, and judicial functions were closely interwoven it would "not attempt to unravel the combination."

[63] State *v.* McDonald, 26 *Minnesota*, 445 (1880).

[64] State *v.* Ensign, 55 *Minnesota*, 278 (1893).

[65] State *v.* Westfall, 85 *Minnesota*, 437 (1902).

county attorneys;[66] to approve the bonds of applicants for liquor licenses.[67]

It will be noted later on that in many states the general drainage acts require the judges of county or district courts to appoint certain officers to act in public ditch proceedings, so that it should be noticed that there is some conflict of authority in the United States on the question as to whether statutes conferring upon the judiciary the power of appointment are unconstitutional as violative of the rule as to separation of functions. The weight of authority, however, upholds such laws, and this is the rule in the courts of the United States, and of Alabama, California, Colorado, Georgia, Illinois, Indiana, Kentucky, New Jersey, New York, Oregon, Pennsylvania, Texas, West Virginia, and Wisconsin.[68] The reasoning of these courts in some cases depends on the character of the appointee, as that he is an officer of the court, as in cases of jury commissioners, or court reporters, or court janitors;[69] or that the appointment of commissioners to borrow money and dispose of bonds involves the exercise of discretion and judgment and is a judicial act.[70] Other cases hold that the appointing power is neither exclusive nor inherent in the executive department, and that therefore it is not an executive function unless expressly made so by organic law or by statute; and that in the absence of such provision it may be exercised by the courts just as well as by the legislative or executive branches.[71] In Illinois a law requiring the appointment of election commissioners by the county court was upheld in part on the theory that the duties to be performed by such commissioners were of a judicial nature since they were to consider evidence, and decide whether the election judges had improperly refused registration;[72] and in some states statutes have been held valid in part because of practical construction.[73] And on the theory that commissioners to adjust and settle matters of indebtedness between counties are in the nature of arbitrators or referees, and consequently judicial in character, it has been decided that the courts may be authorized to appoint them.[74] But there are many other cases in which appointments have been held proper, which can not be sustained upon the principle that the ap-

[66] Rockwell *v.* Fillmore County, 47 *Minnesota,* 219 (1891).

[67] State *v.* Bates, 96 *Minnesota,* 110 (1905).

[68] For cases see note in 6 *American and English Encyclopaedia of Law,* 1060; the following cases cited herein; Goodnow, *Principles of the Administrative Law of the United States,* 40; and 29 *Cyclopedia of Law and Procedure,* 1369.

[69] Stevens *v.* Truman, 127 *California,* 155 (1899); State *v.* Mounts, 36 *West Virginia,* 179 (1892); Matter of Janitor, 35 *Wisconsin,* 410 (1874); State *v.* Noble, 118 *Indiana,* 350 (1888); State *v.* Kendle, 52 *Ohio State,* 346 (1895); White County *v.* Gwin, 136 *Indiana,* 562 (1893).

[70] Sweet *v.* Gwin, 136 *Indiana,* 562 (1893).

[71] Fox *v.* McDonald, 101 *Alabama,* 51 (1892); People *v.* Morgan, 90 *Illinois,* 558, 562 (1878); 29 *Cyclopedia of Law and Procedure,* 1369.

[72] People *v.* Hoffman, 116 *Illinois,* 587 (1886).

[73] Russell *v.* Cooley, 69 *Georgia,* 215 (1882); Terre Haute *v.* Evansville, 149 *Indiana,* 174 (1897).

[74] Tuolumne County *v.* Stanislaus County, 6 *California,* 440 (1856). See People *v.* Provines, 34 *California,* 531 (1868) for criticism of reasoning in this case though not of the result.

pointees are in the nature of officers or agents of the judiciary. Such decisions are those holding that courts may be authorized to appoint election boards or inspectors,[75] police[76] and park commissioners,[77] appraisers of damages from the opening of streets,[78] tax collectors,[79] school commissioners,[80] tax equalizers,[81] commissioners or trustees to carry on the construction of a subsidized railroad,[82] a resident of a county to take charge of and confine an insane person,[83] members of a board of children's guardians,[84] excise[85] and bridge commissioners.[86]

Although it may be said, therefore, that the weight of judicial authority in the United States sustains statutes authorizing the exercise of appointive powers by the courts, yet in Connecticut, Indiana, Iowa, Maryland, Michigan, Montana, North Carolina, and Massachusetts a contrary doctrine has been declared on the theory that appointment to office is an executive function and can not be imposed upon, or delegated to, the judicial department of government.[87]

In Minnesota a statute conferring upon the district courts of the state the power to appoint examiners of titles under the Torrens law, was upheld by the supreme court. Chief Justice Start, speaking for the court, said: "The examiners provided for by this act are subordinate officers or assistants of the courts, to aid them in the discharge of the judicial duties imposed upon them by the act. It was therefore competent and proper for the

[75] Russell *v.* Cooley, 69 *Georgia,* 215 (1882); Ford *v.* North Des Moines, 80 *Iowa,* 626 (1890); Ex parte Siebold, 100 *United States,* 371 (1879); Sundry Citizens, 2 *Flippin's United States Circuit Court,* 228 (1878). See also McDonald *v.* Morrow, 119 *North Carolina,* 666 (1896) to the effect that judges may be required to exercise supervision over election clerks.

[76] Staude *v.* Election Commissioners, 61 *California,* 313 (1882).

[77] Cornell *v.* People, 107 *Illinois,* 372 (1883); People *v.* Williams, 51 *Illinois,* 63 (1869); People *v.* Morgan, 90 *Illinois,* 558 (1878); Ross *v.* Freeholders, 69 *New Jersey Law,* 291 (1903).

[78] Terre Haute *v.* Evansville, 149 *Indiana* 174 (1897); Solem Turnpike Company *v.* Essex County, 100 *Massachusetts,* 282 (1868).

[79] Hoke *v.* Field, 10 *Bush's Kentucky,* 144 (1873).

[80] Johnson *v.* DeHart, 9 *Bush's Kentucky,* 640 (1873).

[81] New Jersey Zinc Company *v.* Board of Equalization, 70 *New Jersey Law,* 186 (1903); State *v.* Myers, 52 *Wisconsin,* 628 (1881); Commonwealth *v.* Collier, 213 *Pennsylvania State,* 138 (1905).

[82] Sweet *v.* Holbert, 51 *Barbour's New York Supreme Court,* 312 (1868); Walker *v.* Cincinnati, 21 *Ohio State,* 14 (1871).

[83] Madison County *v.* Moore, 161 *Indiana,* 426 (1903).

[84] Wilkinson *v.* Children's Guardians, 158 *Indiana,* 1 (1902).

[85] Schwarz *v.* Dover, 70 *New Jersey Law,* 502 (1904).

[86] State *v.* George, 22 *Oregon,* 142 (1896). See also Board of County Commissioners *v.* State, 147 *Indiana,* 476 (1896) to the effect that courts may be required to perform certain duties as to relocation of county seats.

[87] State *v.* Barbour, 53 *Connecticut,* 76, 85 (1895) Evansville *v.* State, 118 *Indiana,* 426 (1888); People *v.* McKee, 68 *North Carolina,* 429 (1873); Taylor *v.* Commonwealth, 3 *J. J. Marshall's Kentucky,* 401 (1830); Heinlen *v.* Sullivan, 64 *California,* 378 (1883); State *v.* Washburn, 167 *Missouri,* 680 (1902); but see Johnson *v.* De Hart, 9 *Bush's Kentucky,* 640 (1873); Supervisors of Election, 114 *Massachusetts,* 247 (1873); Houseman *v.* Kent Circuit Judge, 58 *Michigan,* 364 (1885), but constitution of Michigan, art. VI, sec. 10, expressly prohibits exercise of appointive powers by judges except in a few cases. In Beasly *v.* Ridout, 94 *Maryland,* 641, 659 (1902) quoting Robery *v.* Prince George's County, 92 *Maryland,* 150 (1900), the court says: "The mere fact that a judge is called on by statute to execute a certain function, does not make it a judicial function. Its character is dependent on its qualities, not on the mere accident as to the person designated to do it."

legislature to provide for their appointment by the courts, as much so as would be a statute authorizing them to appoint a stenographer or a receiver in insolvency. . . . . The registration is the act of the court. The fact that it may be done by the registrar, under general orders, where there is no question, is not different from the power of the clerk to enter judgment, in cases ripe for judgment, under a general order or rule of the court."[88] The only case in the state, however, which led to a thorough judicial discussion of the doctrine of the separation of powers and the exercise of appointive functions by the courts, is that of State *v.* Brill, which was decided in 1907. In that case the court held unconstitutional an act of the legislature which empowered and required the judges of the district court of Ramsey County to appoint a board of control to have charge of the almshouse and hospital of that county and for the city of St. Paul. In an elaborate opinion by Justice Eliott, which is one of the leading judicial discussions of the question, it was pointed out that the doctrine of separation of powers is well established under both federal and state constitutions, the history of the development of the theory was traced, and it was said that "The tendency to sacrifice established principles of constitutional government in order to secure centralized control and high efficiency in administration may easily be carried so far as to endanger the very foundations upon which our system of government rests.[89] . . . . Although there are some decisions to the contrary, it is generally conceded that the power to appoint to a public office is in its nature an executive function, ... [although] there are some exceptions which are necessary in order that the several departments may exercise their express powers and functions without embarrassment, ... [such as] the appointment of subordinate officers and employees immediately connected with the court."[90] The supreme court held that this board was administrative in character, entirely disconnected from the judiciary, and that if the courts could be required to appoint its members, they could be compelled, under the same principle, to appoint a mayor, members of the board of public works, a chief of police, all other city and county officers; and the highest court in Minnesota could be required to appoint the state board of control, bank examiner, the regents of the state university, and other state boards and commissions. The judiciary could then be compelled to supervise its appointees, remove them, investigate their actions, report concerning their administration, and even administer the department itself, and thus to render nugatory the constitutional prohibition, and entirely revolutionize the system of government.[91]

[88] State *v.* Westfall, 85 *Minnesota*, 437, 446 (1902).
[89] State *v.* Brill, 100 *Minnesota*, 499, 502 (1907).
[90] *Ibid.*, 525.
[91] *Ibid.*, 499.

The question of the exercise of appointive powers by the courts does not appear to have been directly passed upon or discussed in reported decisions, with express reference to drainage laws. In Illinois the validity of such statutes has been practically assumed without judicial comment or discussion;[92] in Minnesota, as we shall later indicate, a judicial ditch act was held not violative of the constitutional provision for separation of departments, but little or no attention was paid to the appointive feature of the statute.[93] As to the tripartite theory and the supervisory authority of the judiciary in public ditch proceedings, as distinguished from its appointive authority, there is nearly an equal paucity of judicial discussion that is not dicta or beside the point. One Minnesota case squarely decides that such court supervision may be compelled or authorized, and perhaps Indiana and Illinois may be said to have considered the question, and to have come to the same conclusion, but it is doubtful whether they can be cited as plainly supporting the proposition.[94] Indeed, it seems that statutes providing ditch proceedings under the supervision of courts, are chiefly sustainable by arguments from analogy with reference to cases heretofore cited, and to the old established and well-recognized practice of using the judiciary in the establishment of railroads and highways under the power of eminent domain.[95]

From the foregoing discussion it appears that a carefully drawn drainage statute will generally be sustained against the objection that it violates constitutional provisions requiring a separation of governmental powers in that it requires the courts to appoint drainage officers, or to supervise proceedings for the establishment of public ditches. This is upon the theory that the duties imposed are not strictly non-judicial in character; but it might well be argued that even *were* such duties non-judicial, still the acts would be valid on the ground that the constitutional provisions relating to distinct departments are not applicable to work done by, or to functions of, the county or similar public corporation or drainage district, as distinguished from the state itself. This argument need not be based upon any position to the effect that drainage work is not a function of the state government itself, but of its local subdivisions, nor is it necessary to enter into

[92] Blake *v.* People, 109 *Illinois*, 504 (1884); Kilgour *v.* Drainage District, 111 *Illinois*, 342 (1884); Huston *v.* Clark, 112 *Illinois*, 344 (1884); Owners of Lands *v.* People, 113 *Illinois*, 296 (1885).

[93] State *v.* Crosby, 92 *Minnesota*, 176 (1904).

[94] People *v.* Nelson, 133 *Illinois*, 565, 600 (1890); Scott *v.* Brackett, 89 *Indiana*, 413 (1883). See also Bryant *v.* Robbins, 70 *Wisconsin*, 258, 270 (1887).

[95] Citizens' Saving Bank *v.* Town of Greenburgh, 173 *New York*, 215 (1903); Tyson *v.* Washington County, 78 *Nebraska*, 211 (1907); 10 *American and English Encyclopaedia of Law*, 1069 *et seq.*; Lewis, *Eminent Domain* (3d ed.), 739; note in 22 *Lawyers Reports Annotated, New Series*, 1. In Minnesota, see Re St. Paul and Northern Pacific Railway Companies, 34 *Minnesota*, 227 (1885); Stewart *v.* Great Northern Railway Company, 65 *Minnesota*, 515 (1896); Fohl *v.* Sleepy Eye Lake, 80 *Minnesota*, 67 (1900); Minneapolis and Saint Louis Railway Company, *v.* Hartland, 85, *Minnesota*, 76 (1901); Dunnell, *Minnesota Digest*, secs. 3027, 3080, 3094 *et seq.*; and especially McGee *v.* Hennepin County, 84 *Minnesota*, 472 (1901).

that domain of controversy as to whether or not a county or municipal officer in a given case (here that of drainage work) is acting as an agent of the state and as an officer of its central government, or merely as a representative of a public corporation.[96] Indeed, that question has not received much of any attention in the decisions relating to the constitutionality of drain statutes.[97] It is sufficient to take the position that the application of the distributive clause is confined to what is clearly within the sphere of the central government, and to those persons who are clearly and unmistakably its immediate officers. While it is true that there are only a few decisions expressly and squarely supporting this view, there are apparently none to the contrary; and whether or not the courts have in theory as a rule recognized the fact, it is certain that in practice the doctrine of separation has not been applied to counties or to municipal corporations with any degree of strictness or consistency.[98] In county government it has been common for the county boards to exercise mixed functions; to make contracts,[99] provide public buildings,[100] see to the construction of bridges,[101] and highways,[102] manage county funds,[103] control liquor licenses,[104] pass upon claims,[105] and sometimes to levy and collect taxes.[106] In short, a careful separation of powers has not been required by the courts, nor the merger of functions seriously questioned in county affairs. And so in the case of municipal corporations, in the narrow sense of the term, it has been held that the principle of separation should be confined in its application to the departments of the state government, and not extended to those of public corporations such as the city. All the legislative power of the state itself is vested in the legislature, which in the absence of constitutional restraints upon its right to organize municipal corporations, may, in the exercise of its discretion, and so far as the doctrine of separation is concerned, provide for any form of city government, and may vest legislative, judicial, or executive functions in one and the same person or authority.[107] Although this

[96] See 20 *American and English Encyclopaedia of Law*, 1223; Dillon, *Municipal Corporations*, secs. 97, 102, 390.

[97] State *v.* Flower, 49 *Louisiana Annual*, 1199 (1897).

[98] People *v.* Provines, 34 *California*, 520 (1868); discussion *infra;* Staude *v.* Election Commissioners, 61 *California*, 313 (1882); Fox *v.* McDonald, 101 *Alabama*, 51 (1892); 6 *American and English Encyclopaedia of Law*, 1008.

[99] Mitchell *v.* St. Louis County, 24 *Minnesota*, 459 (1878); 7 *American and English Encyclopaedia of Law*, 989 and cases cited therein.

[100] 7 *American and English Encyclopaedia of Law*, 996 and cases cited therein.

[101] *Ibid.*, 997.

[102] *Ibid.*, 999.

[103] *Ibid.*, 1001.

[104] *Ibid.*, 1002.

[105] *Ibid.*, 1003.

[106] *Ibid.*, 1002.

[107] State *v.* Barker, 116 *Iowa*, 96, 89 *Northwestern*, 204, especially at page 208 in *Northwestern;* cases cited hereafter; Cooley, *Constitutional Limitations*, 133; Smith, *Corporations*, sec. 153; 20 *American and English Encyclopaedia of Law*, 1223.

rule seems to have been followed in practice in the United States even from colonial times, and to be generally recognized, yet that recognition is almost entirely a tacit one, and the question has not been the subject of much discussion in adjudicated cases.[108] It has been held that constitutional prohibitions of a merger of functions do not render invalid statutes authorizing or requiring mayors or town clerks to act as justices of the peace;[109] for "from time immemorial similar powers have been conferred upon mayors of cities."[110] Likewise it has been decided that the police judge of a city may constitutionally be compelled by statute to notify the county attorney of violations of the prohibitory liquor laws of the state, and furnish the latter with the names of witnesses to such offences; such decision was upon the theory clearly stated that the provisions of the organic law relating to distinct governmental departments did not apply to municipal authorities or governments.[111] This rule as to non-applicability has been more explicitly stated in cases affirming the constitutionality of city charters providing a commission form of municipal government. Thus, the supreme court of Iowa in 1908 held valid the statute of that state which related to the city of Des Moines, and provided that the powers of the city—executive, judicial, and legislative—should be exercised by a single body composed of the mayor and four councilmen. The court said, in giving its reasons for upholding the statute: "Mayors of cities and towns have conferred upon them powers and duties both executive and judicial, and, particularly in towns, the mayor, in virtue of his right to vote on all questions coming before the council, constitutes in all strictness a part of the corporate legislative body. Boards of supervisors, city and town councils, boards of school directors, township trustees, and various individual officers are directly charged with and are in the performance of powers and duties, now, administrative in character, and again judicial, etc. . . . . The statute book of this State, as of every State in the Union, is replete with illustrative examples."[112] And in Minnesota the commission charter of Mankato was upheld by the court upon a similar line of reasoning, the court but briefly referring to the authorities on the question, including the California case of People *v.* Provines.[113]

In that case the supreme court of California, overruling a long line of its own decisions on the point, squarely and explicitly took the position

[108] 6 *American and English Encyclopaedia of Law*, 1008. As to mayors as judicial officers, see McQuillen, *Municipal Corporations*, sec. 433.

[109] Uridias *v.* Morrill, 22 *California*, 474 (1863); Baltimore and Ohio Railroad Company *v.* Whiting, 161 *Indiana*, 228 (1903); Santo *v.* State, 2 *Iowa*, 164 (1855).

[110] Santo *v.* State, 2 *Iowa*, 164, 220 (1855).

[111] State *v.* Keener, 97 *Pacific*, (*Kansas*, 1908) 860.

[112] Eckerson *v.* City of Des Moines, 137 *Iowa*, 452, 466 (1908). To the same effect see Bryan *v.* Voss, 143 *Kentucky*, 422 (1911) and State *v.* Ure, 135 *Northwestern*, 224 (*Nebraska*, 1912).

[113] State *v.* Mankato, 136 *Northwestern*, 264 (*Minnesota*, 1912).

that the very definite constitutional provisions of that state relating to tripartite government were not applicable to local governments such as counties or municipalities. Although the court based its decision in part upon the wording and arrangement of the sections of the constitution and in part upon the fact that there are no county or city officers referred to in the express exceptions to the prohibition of a merger of functions, yet its position was justified principally by reasons which would apply to cases arising under the organic law of nearly any state in the Union. These are (1) that in practice separation has never been strictly enforced in local affairs; (2) that such an enforcement results in a reductio ad absurdum, and would require a multiplicity of officers, and so cumbersome and unwieldy a procedure in many cases as to be preventive of any efficiency or expedition in the administration of local matters; (3) that it was not the purpose or intention of the constitution makers to extend the doctrine of distinct departments to the minor subdivisions of the state. In speaking of the reasons why such provisions were incorporated into organic laws in the United States, the court referred to the development of abuses in England from the lodgment of more than one function in the same authority, and then said of the framers of American constitutions: "The mischief, however, against which they sought to provide, did not come from inferior or subordinate officers, but from the higher grades, in whose hands the first and leading powers of the government were vested. So far as the former were concerned, they were sufficiently under the control of the latter. Abuse of power could not come from the former in such measure as to destroy or overthrow the liberties of the people, except by directions or connivance of the latter. To surround the latter with checks was a sufficient protection against the former. Hence the framers of American constitutions were content with checks upon the latter, leaving the former, as we consider, to be regulated by the legislative department."[114]

From the foregoing review of the authorities, it seems generally established in the United States that, even in the absence of specific constitutional authorization, the legislature of a state may enact general drainage statutes, which, if properly drafted, will be sustained as a legitimate exercise of the powers of eminent domain or taxation or of the police power, against any attacks upon the ground that they impose non-judicial functions upon the judiciary and are therefore violative of those provisions common in our or-

[114] People *v.* Provines, 34 *California*, 520 (1868) overruling Burgoyne *v.* Commissioners, 5 *California*, 1 (1855) and later cases to same effect, and followed in California in Holly *v.* County of Orange, 106 *California*, 420 (1895) upholding a drainage statute. See also Elliott, *Municipal Corporations*, 196. For cases of mixed functions in local affairs, see appellant's brief in Burgoyne *v.* Commissioners, 5 *California*, 1 (1855); as to county courts, Stone *v.* Wilson, 39 *Southwestern*, 49 (*Kentucky*, 1897); State *v.* Judges, 21 *Ohio State*, 1 (1871); Walker *v.* City of Cincinnati, 21 *Ohio State*, 14 (1871); and, as to municipal courts, Phinizy *v.* Eve, 108 *Georgia*, 360 (1899).

ganic laws to the effect that the powers of government shall be exercised by three distinct and separate departments.

In Minnesota the right of the legislature to enact general drainage statutes without express constitutional authority has been referred to the police power, the power of eminent domain, and the taxing power.[115]

The bases of the legislative right were merely incidentally referred to in the cases of Curran *v.* Sibley County and Witty *v.* Nicollet County, decided in 1891 and 1899 respectively. The first case passed upon by the supreme court of the state in which the authority of the legislature was directly challenged, and the constitutionality of drainage laws in Minnesota squarely at issue was Lien *v.* Norman County, which was decided in 1900, thirteen years after the enactment of the first great drainage statute in Minnesota. In that case it was claimed that the act of 1887[116] was unconstitutional because it authorized the taking of private property for a private use, and provided for a levy of taxes which were not uniform or based upon the value of the property. The supreme court, however, held the act constitutional. Speaking through Justice Brown, it said: "The authority of the Legislature to enact drainage laws is derived from the police power, the right of eminent domain, or the taxing power, and is undoubted. (10 *American and English Encyclopaedia of Law* [2d ed.], 223.) It is founded in the right of the state to protect the public health, and provide for the public convenience and welfare . . . . Where the laws have for their object the reclamation of large tracts of wet and swampy land for agricultural purposes, they are sustained under the right of eminent domain. The fact that large tracts of otherwise waste land may be thus reclaimed and made suitable for agricultural purposes is deemed and held to constitute a public benefit. When the object is to drain such lands in the interest of the public health and welfare, such laws are sustained and upheld as a proper exercise of the police power. (Bryant *v.* Robbins, 70 *Wisconsin*, 258; Wurts *v.* Hoagland, 114 *United States*, 606.[117] . . . .) There can be no question but that the act is in the interest of the public, and for exclusively public purposes. No ditch can be established or laid out thereunder unless the county commissioners expressly find that it will be of 'public utility or conducive to public health or of public benefit or convenience.' . . . . It does not matter that in accomplishing the public objects of the act private interests are advanced. Such a result is merely incidental, and does not effect the validity of the law.[118] 'It is not necessary in order to consti-

[115] Curran *v.* Sibley County, 47 *Minnesota*, 313 (1891); Witty *v.* Nicollet County, 76 *Minnesota*, 286 (1899); Lien *v.* Norman County, 80 *Minnesota*, 58 (1900); State *v.* Polk County, 87 *Minnesota*, 325 (1902); State *v.* Rockford, 102 *Minnesota*, 442 (1907). (Act unconstitutional); Van Pelt *v.* Bertilrud, 117 *Minnesota*, 50 (1912).

[116] Minnesota, *Laws*, 1887, ch. 97, *General Statutes*, 1894, sec. 7793 *et seq.*

[117] Lien *v.* Norman County, 80 *Minnesota*, 58, 62 (1900).

[118] *Ibid.*, 64.

tute a public use, that the whole community or any large portion thereof, should participate in the use, or that all should be equally benefited (Ross *v.* Davis, 97 *Indiana*, 79; Talbot *v.* Hudson, 16 *Gray*, 417; Chesbrough *v.* Commissioners, 37 *Ohio State*, 508; 10 *American and English Encyclopaedia of Law* [2d ed.], 225.) The benefits may be limited to the inhabitants of a small locality, and, if they are enjoyed in common by all, the use is sufficiently public[119] . . . . In all cases where such laws are authorized the further power and authority to provide for assessing the cost and expense of the improvement against the lands benefited follow as a natural result. The power to so assess the cost of the improvements against lands benefited is a necessary and proper incident to the exercise of the power to make the improvement. And a statute providing therefor is not open to the constitutional objection that it is unequal taxation."[120]

The constitutionality of the act of 1897[121] was attacked in 1903, but merely on the ground that it embraced more than the subject expressed in its title. This claim was held untenable, and the validity of the act affirmed.[122]

The drainage act of 1901[123] differed from prior statutes in this state in that it did not expressly and in so many words declare that its purpose was to subserve the public health, convenience, or welfare; nor did it specifically provide for a determination by the county commissioners of the question as to whether or not a particular ditch was of public utility. And it was again urged by those seeking to overthrow the statute that it authorized the taking of private property for a private purpose. The court, however, refused to recognize these objections to the law. Citing authorities to sustain its position, it said that "While the element of public health is often made an important factor in the consideration of statutes of this kind, it is believed that any public benefit, such as the improvement of highways or the reclamation of large tracts of otherwise waste lands, is sufficient to support and sustain them.[124] To authorize proceedings under the statute, therefore, that question[125] must be determined either at the preliminary hearing upon the petition, or at the second or final hearing. While the statute does not, in express terms, require the board to determine it, the existence of the fact being essential to their authority to proceed in any case, and essential to the validity of the statute, too, the power to determine it must be implied."[126] The court not only applied in this case the familiar principle that

[119] *Ibid.*, 58, 67.
[120] *Ibid.*, 63.
[121] Minnesota, *Laws*, 1897, ch. 318.
[122] Gaare *v.* Clay County, 90 *Minnesota*, 530 (1903).
[123] Minnesota, *Laws*, 1901, ch. 258.
[124] State *v.* Polk County, 87 *Minnesota*, 325, 335 (1902).
[125] Whether a public benefit.
[126] State *v.* Polk County, 87 *Minnesota*, 325, 341 (1902).

the presumption is in favor of the constitutionality of legislative acts, and that they should not be declared void on account of mere mistakes, omissions, or inaccuracies of language, unless a clear repugnance to constitutional provisions results therefrom;[127] but it frankly admitted the influence of considerations of expediency upon its decision, and expressly referred to the fact that large sums of money had been spent in numerous proceedings already conducted under the statute, and that disastrous results would follow, were the court to hold the act invalid.[128]

In the case of State *v.* Crosby[129] the supreme court of Minnesota affirmed the validity of the drainage statute of 1902.[130] This act related to the construction of ditches under the authority of the district court; it was attacked on the ground that it attempted to confer upon the courts legislative and administrative powers. The supreme court in its opinion written by Justice Brown said: "The marked tendency of legislation in recent years, not only in this state, but in other states, has been, to a large degree, to break away from the theory of three separate and independent departments of government, by imposing upon other departments duties and powers of a legislative character, which the courts have been inclined to sustain. Perhaps few if any cases are to be found, however, where statutes imposing purely legislative duties and powers upon the courts have been upheld; but the authorities are numerous, sustaining statutes which impose upon the courts powers involving the exercise of both judicial and legislative functions—such as the condemnation of land for public purposes, the appointment of commissioners of election in proceedings for adding territory to municipal corporations, and laying out and establishing highways. The proceedings provided for by the statute under consideration involve the exercise of both legislative and judicial powers. The question of the propriety or necessity of public ditches to drain marshy or overflowed lands is one of legislative character. The condemnation of land through which such ditches may be constructed, the assessment of damages, and the determination of the legal rights to parties affected are judicial. The exercise of all these powers is involved in proceedings under the statute.

"The power and authority to lay out and open public highways is legislative in its nature and essentials, and in no sense except in some details is it judicial. Yet we have sustained legislation providing for the laying out and opening of so-called judicial highways; statutes conferring upon the district courts of the state authority to lay out and open highways where they extend into two or more counties. (State *v.* Ensign, 55 *Minnesota,*

[127] *Ibid.*, 334.
[128] *Ibid.*, 343.
[129] 92 *Minnesota*, 176 (1904).
[130] Minnesota, *Laws*, 1902, ch. 38.

278; State *v.* McDonald, 26 *Minnesota,* 445) . . . . Though the power and authority in each case is legislative in character, in carrying out and applying the statute the exercise of judicial functions is also involved. No distinction can be made between the judicial highway and the judicial ditch. . . . . There being no logical distinction, the statute under consideration must be sustained, or we must overrule the cases just cited. We prefer to follow those decisions and sustain this statute."[131]

The judicial ditch act was again attacked in 1904, but there was little said as to the public purpose of the statute. It was claimed that since the law[132] required an assessment against the landowners for all the benefits received, and then permitted the town supervisors to assess the same lands for the cost of repairs and the removal of obstructions, there was double taxation, and the taking of property without due process of law. But the court, following its previous decisions in State *v.* Polk County and State *v.* Crosby, held the act constitutional, reaffirming its position in a very brief opinion.[133]

In the case of Miller *v.* Jensen[134] the supreme court upheld the validity of the act of 1905[135] against the objection that it authorized the taking of private property without due process of law and for a private purpose. Chief Justice Start in the opinion dismissed the objections of those opposed to the law with a brief reference to the prior decisions of the court.

Chapter 191 of the Laws of 1907 was declared unconstitutional in that year in State *v.* Rockford.[136] The court pointed out that the county drainage act had been held public in character and therefore constitutional, and did not question the correctness of its prior decisions to that effect. But it held that the act of 1907 was different in character. Under it proceedings could be instituted (1) when public health might be in danger, (2) when the drainage would result in the reclamation of waste lands, (3) *or* "where the construction of such ditch or drain is [was] of benefit to the lands of the adjoining owner or owners." The court said: "The use of the disjunctive in this connection is significant. . . . . Under the express terms of the law the property of adjoining landowners may be taken for a private purpose only. . . . . The law authorizes the taking, against the owner's will, of enough of his lands to make a ditch, or the imposition of a burden on that land to that extent against the owner's will, and for the benefit of an adjoining landowner. It is plainly designed to promote individual convenience."[137]

[131] State *v.* Crosby, 92 *Minnesota,* 176, 180, 181 (1904).
[132] Minnesota, *Laws,* 1901, ch. 258, as amended by Minnesota, *Laws,* 1902, ch. 38.
[133] McMillan *v.* Freeborn County, 93 *Minnesota,* 16 (1904).
[134] 102 *Minnesota,* 391 (1907).
[135] Minnesota, *Laws,* 1905, ch. 230.
[136] 102 *Minnesota,* 442 (1907).
[137] State *v.* Rockford, 102 *Minnesota,* 442, 444 (1907).

In 1908, section 40 of chapter 448 of Laws of 1907 was likewise declared void and unconstitutional; but this was not upon the ground that the purpose of the statute was not public, but because of a faulty method of assessing benefits, which the court considered as resulting in taking private property without due process of law, and without just compensation therefor.[138] But the act was also criticized because it failed to specify the purpose to which payments by landowners into the county treasury were to be devoted; so that it was problematical whether or not that purpose was a public one.[139]

Chapter 230, section 26, Laws of 1905 authorized the county commissioners to widen and deepen ditches, and to assess the costs of repairs and removing obstructions against the owners of land benefited without any provision being made for a hearing. This the court held invalid because without due process of law. It pointed out that if the statute authorized ordinary repairs it would follow Iowa and some other states, and hold notice and hearing unnecessary because of the small amount involved and the delay that would result from requiring such hearings. But this act went farther and permitted the county commissioners to widen and deepen ditches already built. This might result in the construction without notice or hearing of new ditches in effect, if the enlargement were sufficiently great. To that extent the act was unconstitutional.[140]

These last two decisions of the supreme court of Minnesota show that it is careful to preserve the ostensibly public character of drainage acts as a justification for them. But it is clear that in Minnesota, as in other states, the courts have seen that unless some constitutional ground for general drainage acts could be found, less progressive owners of land, by refusing to allow their more progressive neighbors to build ditches across their lands

[138] Lyon County *v.* Lien, 105 *Minnesota*, 55 (1908). In this case the court in its opinion pointed out that if, after a public ditch has been constructed, and the entire cost thereof assessed upon all lands benefited thereby, another ditch be constructed so that it discharges its waters into the original ditch, whereby the cost of keeping the first drain in repair and of enlarging it when necessary is increased, it is obvious that the lands benefited by the new ditch should be assessed for their just and proportionate share of the cost of maintaining the original ditch; that the legislature evidently intended to enforce this equity by the section in question; that it arbitrarily provided that the owners of land along the new or second ditch should pay into the county treasury the same proportion of the benefits received by their lands that the lands assessed for the original ditch were forced to pay; that is, this did not provide any reasonable means of ascertaining the actual benefits to landowners along the new ditch from the maintenance of the first one. The cost of establishing and constructing the original drain, matters as to which landowners benefited by the new ditch had neither notice nor opportunity to be heard, were by the act in question made the basis of an inflexible rule. If the method prescribed by the statute were followed in a case where the cost of building a certain ditch was seventy-five per cent of the benefits received, then the owners of the land drained by it before a second ditch was constructed so as to empty into it, were forced to pay into the county treasury a sum equal to that seventy-five per cent. But those benefited by the new ditch must also pay into the treasury a corresponding seventy-five per cent. This the court held to be a taking of an amount arbitrarily fixed, without any reasonable relation to benefits received, and therefore uncompensated and without due process of the law.

[139] Lyon County *v.* Lien, 105 *Minnesota*, 55 (1908).

[140] State *v.* McGuire, 109 *Minnesota*, 88 (1909). For a brief reaffirmance of the constitutionality of drainage acts see Van Pelt *v.* Bertilrud, 117 *Minnesota*, 50 (1912).

could prevent the reclamation of swamp lands, and retard the development of the country. But it is also apparent that in many cases, as an actual fact the purpose of the work is really private, and for no public purpose whatsoever, so far as the legal definition of that term is concerned, and that the courts have seized upon the possible benefits to the public health or welfare as a mere pretext for upholding legislation which practically everyone agrees to be wise.[141]

The legislatures of the states, in the exercise of their constitutional right to enact general drainage statutes, have as a rule provided a system of drainage procedure, the principal features of which are substantially as follows:

1. The county court, or circuit court, county commissioners or supervisors, are given authority to administer the law, and in most states the procedure is kept within the county (although sometimes several counties may coöperate); and with the exceptions of South Carolina and California, which require reports to the governor, and Minnesota and Florida, which have state commissions, the state government itself takes no direct part in the work.

2. The proceedings are initiated by petition to the county commissioners or corresponding authority, signed by a certain number of landowners, describing the lands which it is proposed to drain, and indicating in general the location, size, direction, and number of proposed ditches, and asking for the establishment of a drainage district. The petition must be accompanied by a bond conditioned to pay all costs in case the board refuses to establish the drainage district.

3. If the petition complies with the law, the board appoints a certain number of viewers, who examine the land, and file with the board a report containing a description of the lands that will be benefited or damaged, the amount and kind of drainage required, and a finding as to whether the total costs of the work will exceed the total amount of the estimated benefits.

4. The board, after published and personal notice to persons whose lands will be likely to be affected by the proposed work, has a hearing at which objections to the proposed work are heard and considered, as well as the report of the viewers. The board may either dismiss the petition, if it discovers that the work will cost more than it is worth, or if it will not be of public benefit or utility; or it may declare the drainage district organized.

5. When the district is organized the board orders a complete survey, maps, plans and specifications to be made by an engineer and a report is filed by him which contains an estimate of the cost, and a description of the lands benefited or damaged.

6. The board may amend or adopt the engineer's report; then it either awards damages to, or assesses benefits against, individual landowners itself, or it appoints special commissioners to do that work. The reports of assess-

[141] Freund, *Police Power*, (1904 ed.), secs. 127, 441, 442.

ments charged against, and damages allowed to, each tract of land are filed with the board, and then a public hearing is held at which persons charged with benefits or allowed damages may object to such awards and assessments. These may then be changed by the board so as to make them more equitable.

7. The board lets contracts for the work to the lowest responsible bidders and appoints an engineer to supervise the work,[142] and report as to whether or not the plans and specifications are being complied with by the contractors.

8. The assessments for benefits as a general rule are made a first lien upon the property benefited, and are usually collected in the same way as taxes, but generally in installments extending over several years. The moneys collected constitute a separate drainage fund which is used to reimburse the county for preliminary costs advanced by it, and to pay off the bonds issued by it or the district. In many states these bonds may be issued to the extent of ninety per cent of the cost of the work, provided the landowners so decide by vote, or, in some cases so request in their petition. The laws generally provide that the bonds shall not be sold at less than par, and prescribe a maximum rate of interest. The landowners are protected by provisions for due notice to them of all steps in the procedure which may affect their interests, and by the right to file protests against the proceedings, or to object at public hearings or otherwise to allowances of damages and assessments of benefits, and to appeal to the state courts.[143]

To enter into a discussion of the adjudicated cases relating to drainage procedure would be proper in a treatise on the law of public drains, but would unnecessarily prolong this work, and would not be particularly valuable since it would involve a treatment of many questions of detail dependent for their solution largely upon the construction or provisions of particular statutes. It seemed best to confine the statement of the principles derived from the case law on the subject of public ditch acts, to the broad question of the constitutionality of such laws.[144]

[142] Sometimes the statutes require that the work be done by the county surveyor.

[143] In Appendix 2 is given a list of the statutes upon which the text is based and a brief summary of their provisions. For the sake of clearness and of brevity, it seemed best to confine a discussion of the statutes in particular states and of any provisions not covered by the text, because of their local or peculiar character, to the appendix. If any state is not referred to in this appendix it is an indication that up to the year 1914 it had enacted no general drainage law.

[144] For statements of the law relating to questions of more detail and of procedure, see articles on drains in such works as *American and English Encyclopaedia of Law; Cyclopedia of Pleading and Practice; Cyclopedia of Law and Procedure;* notes in 53 *American Reports,* 350; 15 *American and English Annotated Cases,* 908; and in *Lawyers Reports Annotated,* especially 60 *Lawyers Reports Annotated,* 161 *et seq.,* and 58 *Lawyers Reports Annotated,* 353 *et seq.*

CHAPTER V

THE DEVELOPMENT OF DRAINAGE LEGISLATION IN MINNESOTA

The first law relating to drainage in Minnesota was an act of August 3, 1858, entitled, "An Act to regulate and encourage the drainage of lands." This statute provided that any number of persons might associate for the purpose of draining lands, and be incorporated with the usual powers of a corporation, after filing a copy of their proposed charter with the registers of deeds of the counties through which their drains were to be constructed. Before the corporation could commence to construct ditches it would have to secure the written consent of the majority of the owners or occupants of the lands through which the drains were to pass. Published or posted notices were to be given of the course of proposed drains, and a description of the lands over which they were to be laid out. Such drainage companies could levy a pro rata tax on all lands benefited. Landowners assessed could construct lateral ditches, but no other persons were authorized to do so without the consent of the corporation. The land drainage company was to be liable for all damages due to its drains injuring or overflowing lands of private owners without their consent. Such damages were to be assessed by a jury in action brought in any court of record, but no vindictive damages were to be allowed.

Three years after the passage of this act, when land was still plentiful and cheap, and men were engrossed in the problems of a new frontier state, it was perhaps natural that Governor Ramsey should refer optimistically and but briefly to the drainage problem in Minnesota. After referring to the fact that the state has 5,000,000 acres of swamp lands, not "miasmatic bottoms, reeking with the elements of disease," but "flat low lands of the summit levels," he says of them in his message to the legislature in January, 1861: "From their nature and situation they are capable of easy reclamation; and in fact this is being gradually effected without expense, by the progress of cultivation and settlement. And it is a well-known fact that a constant and rapid process of drainage is going on in the upper lake country by the silent agency of nature, which in no long time will add largely to the agricultural areas of the state. In a climate so dry as ours, we may naturally expect that lands of this class will eventually be the most valuable in the state." Far-seeing as Governor Ramsey was as to the future value of these lands, he thought that it would be sufficient if "the silent agency of nature" were aided merely by requiring purchasers of swamp lands from the state

to drain them as one of the conditions of sale. He made no further suggestions as to drainage legislation.

As might be expected, there was no drainage legislation during the period of the Civil War, but by chapter 27 of the Laws of 1866, it was provided that any person owning swamp land and desiring to drain it, but considering it necessary to ditch lands of other persons, who refused to permit him to do so, might apply to a justice of the peace. Such justice would cause summons to be served to such owner if a resident of the county, and if not, then on the occupant of the lands through which the applicant desired to construct a drain. After sufficient notice and hearing, the justice of the peace might dismiss the application for any sufficient reason, or else he could summon a jury in the same way as in a civil case. This jury should personally examine the premises and report to the court whether or not it considered that the ditch petitioned for would be "necessary and advantageous" and also report the amount of damages which it considered just compensation to the owner of the land crossed by the ditch. Appeal from this finding could be taken to the district court. The work could not be proceeded with until the applicant paid to the person through whose lands he wished to construct the ditch, the amount of the damages assessed by the jury. The person laying out the drain, his heirs and assigns forever, were to have the right to enter on other lands for the purpose of cleaning and repairing the ditch, and persons obstructing it were to be liable to the one constructing it in double damages, such damages to be determined by a jury.[1]

In 1874 a statute was enacted which authorized the board of town supervisors in any township to open ditches for the purpose of draining public highways. On notice from the overseer of highways, the chairman of the board of town supervisors was to call a meeting of the board, and then the members were to examine the premises personally, have a public hearing after published and posted notice, and then assess damages and benefits against landowners, and order the construction of the ditch by the supervisor of highways under their direction, if they should deem such action advisable. All damages were to be paid in the same way as those assessed for the construction of public highways. Appeal could be taken to the district court as in civil actions.[2] It will be noticed that the prime object of this law was not the drainage of lands for agricultural purposes, but for the improvement of highways.

In 1877 an act was passed "to provide for the draining of wet lands, marshes, and swamps." Persons desiring to open ditches across the lands of neighbors who refused to allow such construction, could appeal to the town supervisors, who were to hold a public hearing after due notice, de-

[1] Minnesota, *Laws*, 1866, ch. 27.
[2] *Laws*, 1874, ch. 57.

termine on the application, assess damages and benefits, and determine the course of the drain. The applicant, after first paying the damages assessed, was to construct the ditch himself, and after it was completed if the landowners assessed for benefits did not pay such assessments to the applicant who built the ditch, such assessments were to be filed with the register of deeds and constitute liens on the lands benefited. Persons feeling aggrieved as to assessments for damages could appeal to the district court.[3] Thus, by this statute of 1877, the principle of a public hearing and an assessment of damages and benefits by the town supervisors in the drainage of highways under the law of 1874, was carried over and applied to the drainage of lands of private persons for purely agricultural purposes. The requirement of the law of 1866 (relating to action by the justice of the peace) that the one desiring the ditch should build it himself and first pay the damages, was continued.

An act of March 10, 1879, provided, among other things, that when it should be necessary to extend any drain into more than one town, the supervisors of the town where the application was first filed should submit the same to the county commissioners of that county at the first subsequent meeting, and on being satisfied that such ditch or drain was a "public necessity or accommodation" such county commissioners should direct the supervisors of the several towns to take measures for the construction or extension of such ditch in their respective towns.[4] This statute may be noticed for two reasons: (1) because it marks the first use of the board of county commissioners, which has been one of the chief agencies used in drainage work in this state, and which is still the basis of Minnesota's drainage system, and (2) because it is one of the first illustrations of the fact, that, as drainage work progresses, it becomes necessary to extend the ditches over larger and larger portions of the watershed, and, as a consequence, governmental agencies having successively greater territorial jurisdictions are found necessary. In this particular instance, no doubt those who had constructed ditches as far as they could under authority of the board of supervisors, that is, to the township line, often found difficulty in getting neighboring supervisors to permit them to enter their townships at all, or at least soon enough to be of any benefit to such ditch constructors. And so the county commissioners were to be used as a means of securing that united and reasonably prompt action by several town boards that was found necessary whenever a ditch was to extend through more than one township.

Probably this act of 1879 did not prove satisfactory to those who wished to open drains through more than one township, for a statute of March 1, 1883, provided for regular proceedings directly through the board of county

[3] *Laws*, 1877, ch. 91.
[4] *Laws*, 1879, ch. 38.

commissioners, without any action by the town supervisors. This law, chapter 108, furnishes many of the principal features of the present scheme of drainage procedure. It provided that the board of county commissioners should have power at any regular session, when the same should be "conducive to the public health, convenience, or welfare," or where the same would be of "public benefit or utility," to cause drains to be constructed in the county. The principal acts authorized or required by the law were as follows:

1. Petition filed with the county auditor, signed by one or more of the landowners whose lands were liable to be affected by, or assessed, for the construction of the proposed drain, setting forth its course in general.
2. Bond by petitioners, conditioned to pay all expense in case the county commissioners should not establish the ditch.
3. Appointment of three resident freeholders as viewers.
4. Viewers, with a civil engineer, to make a survey of the course of the proposed ditch, estimate the cost of the work in detail, "apportion to each parcel of land and to each corporate road or railroad and to the county when public highways are benefited a share of said work in proportion to the benefits which will result to each from such improvement," provide general plans for the ditch, and determine whether it will be of "public utility." The viewers also to assess the damages that any person might sustain by reason of the construction of the ditch, to establish the route, and report in full to the county auditor by a certain time.
5. Notices to be published, and posted in certain places for three successive weeks by the auditor, describing route, lands crossed or assessed, time and place of hearing, etc.
6. Public hearing at which the county commissioners determine whether the ditch will be of public utility, or convenience, or will promote the public health.
7. Review of the proceedings of the viewers to be taken by "reviewers" on remonstrance of persons interested in the ditch.
8. Final report, and order of construction by the county commissioners.
9. Appeals by persons "aggrieved" from order of the county commissioners determining: (a) whether conducive to public health, convenience, or welfare; (b) whether route is practicable; (c) whether assessments are in proportion to the benefits; (d) amount of damages allowed.
10. Auditor to let jobs to lowest bidders.
11. Acceptance by county surveyor, by certificate; such to be liens on the lands against which such pieces of work were respectively charged; collected like taxes.

12. Repairs to be made by town supervisors; paid for out of general township fund, reimbursed by assessing lands for benefits.

Thus, the town supervisors, who had been the agencies used in the drainage laws of 1877, were now to be used for the purpose of making repairs instead of original construction.

The act of 1883 further provided that whenever the route of a proposed drain was to extend into two counties or more, the petition should be signed by one or more of the landowners in each county whose land was liable to be assessed, and filed with the auditor of the county containing the head or source of the proposed drain. A copy of the petition should then be transmitted to the auditor of each other county interested, after which the county commissioners of such counties should appoint viewers to meet and act conjointly. The joint ditch could then be established by action of the county commissioners, auditors, viewers, and other officers, acting together, and following the procedure provided for ditches extending through single counties alone, so far as practicable.[5] Thus, there was an attempt to anticipate the demand that would be sure to arise for some means of securing the action of the necessary officials in more than one county whenever it should be found necessary or advisable to extend a ditch into more than one county. We shall note later on that this provision for the joint action of several different bodies proved unsatisfactory in the same way that the act of 1879, which required the working together of different boards of town supervisors, where a ditch was to extend into more than one township, did not work well.

Between 1875 and 1891 there were fifteen acts passed authorizing certain persons named in the acts to drain lands bordering on certain lakes, or to lower such lakes on securing the written consent of landowners affected, and in some cases filing such consent with the registers of deeds and acknowledging them in the same way as deeds of real estate.[6] In 1883 and 1885 certain named persons by special act were empowered to drain specified lakes on complying with the laws of the state relating to the drainage of wet lands.[7] Acts of 1875 and 1876 authorized any persons to drain lands near lakes named in the acts on giving bonds to the county commissioners conditioned to pay all damages assessed by such commissioners in case the ditching should be accomplished.[8] A special statute of 1883, passed three days before the "county commissioners" drainage law of that year, permitted the drainage of a lake in Douglas County by certain named persons, provided the total costs were paid "by all the owners of lands whose lands shall be benefited by such drainage."[9] And an act of 1887 gave the county commissioners of Anoka County authority to ditch certain marsh on apportion-

[5] *Laws*, 1883, ch. 108.

[6] *Special Laws*, 1875, ch. 152, 153, 159; 1876, ch. 192, 193, 194, 195; 1877, ch. 127; 1879, ch. 187; 1883, ch. 268, 309; 1885, ch. 193; 1889, ch. 358, 300; 1891, ch. 408.

[7] *Special Laws*, 1883, ch. 267; 1885, ch. 192.

[8] *Special Laws*, 1875, ch. 157; 1876, ch. 190.

ing the benefits, damages, and expenses, and complying with the requirements of the law of 1883 and acts amendatory thereto.[10] These statutes, special in character as they are, are indicative of the difficulties met with during this period from 1875 to about 1887 or 1891, in connection with the drainage of meandered lakes, and the dealing with special problems in certain localities, as well as the need of a comprehensive code of drainage laws.

The first organized attempt to secure the enactment of a carefully worked out, comprehensive statute that would provide a satisfactory procedure for the drainage of wet lands, arose in the Red River Valley, because of the great need of drainage in that section. The Minnesota side of the Red River Valley is composed of three planes, all of which slope towards the north, like the bed of the river. The planes to the west and east have a sufficient incline to be tolerably well drained by natural watercourses, but the middle plane, which is ten miles wide and about two hundred and twenty-five miles long, has very little slope, is crossed by practically no small streams, and its drainage aided very little by the few large ones because their courses are so winding as to be incapable of rapidly carrying off storm water. Red River lands are, as is well known, among the richest wheat-producing lands in the world, but the farmers in this middle plane soon found its lack of proper drainage a serious handicap. If they seeded early, a frost would be almost certain to destroy their crop, because the soil remained wet so late in the spring that a frost was more disastrous on their lands than on the better-drained and drier lands to the east and the west. If they put off their seeding until they were sure to escape any late frosts, they had difficulty in maturing their crops, or else they frequently lost advantages which might have been gained had they been able to get their wheat earlier to market. Thus, it was natural that the need and advantages of artificial drainage should early be seen in this section of the state, and that landowners there should take the first steps as an organization to secure public action.

The first attempts to drain lands in this middle section that can be traced were made under the direction of Mr. J. J. Hill, as president of the St. Paul, Minneapolis and Manitoba Railway Company, one of the predecessors of the Great Northern Railway Company. About 1879, ditches were constructed along the line of the railroad for the purpose of carrying off storm waters, especially in the spring. It is true that prior to that year certain energetic owners of large farms in the valley had built a few drains, but these were quite small and were strictly private enterprises. The Great Northern ditches were about fifteen in number, and their aggregate length was about forty-five miles. With the exception of one ditch sixteen miles

[9] *Special Laws*, 1883, ch. 257.
[10] *Special Laws*, 1887, ch. 357.

long they were from one half to three miles each in length, not much more than three feet wide at the bottom, and not very deep. They were located in Kittson, Polk, Norman, and Clay counties.[11] As the engineer for the drainage commission says in the report of 1899: "Without doubt much good was done by these small pioneer ditches, not the least of which was the object lesson they furnished to the farmer of what service even small drains could be. From the working of these they could easily see of what incomparable good larger ditches would be if they were of adequate size."[12] Thus, it is clear that these railroad and private ditches, though small, strictly local in character, and far from adequate, especially during the spring freshets, were nevertheless of importance as leading the way to the development of a comprehensive system of drainage.

In June, 1886, newspapers in the Red River Valley published a call for "a general mass convention" of the people of that section to meet in Crookston on the first and second of July, "for the purpose of considering the subject of drainage in said section generally, and to devise means for the accomplishment of a thoroughly effectual and general system of drainage for said section of country." All interested persons and three delegates from each of the towns and cities in Wilkin, Clay, Marshall, Polk, Norman, and Kittson counties were invited to be present and take part in the discussion.[13] At the meeting of the convention in July, two of the principal addresses were given by Mr. J. J. Hill, and Mr. C. G. Elliott, a drainage engineer from Illinois.[14] The former pledged the hearty coöperation of the railroad company which he represented, and which at that time owned 1,013,000 acres of land in the Red River Valley, and suggested a payment for drainage work by direct assessment on lands benefited. The latter, after pointing out the great benefits to be derived from drainage in the valley, described the plan of doing work in Illinois, where a majority of the landowners in any township, not less than one third of the area being represented, might petition the county authorities for a survey, after which the work might be constructed under the road masters who acted as ditch supervisors. The expense of main drains was met by issuing bonds, and sub-drains were built on the farms of private landowners at their own expense. One skeptical delegate said that the whole valley was not worth enough to pay for the cost of drainage, and a few representatives from Kittson County were a little afraid that the construction of drains opening into the Red River might lead to the overflowing of that stream to the damage of the lands along the lower

[11] Drainage Commission, *Report*, 1899.

[12] W. R. Hoag in *ibid.*

[13] *Crookston Times*, June 5, 1886. Call signed by E. D. Childs, M. R. Brown, H. Steenerson, William Main, C. Sangstad.

[14] Mr. Elliott, up to a recent date, was chief of drainage investigations for the United States Department of Agriculture.

part of its course.[15] These men were, however, in a very small minority. It was the general opinion of the men in the convention that before anything could be accomplished there must first be an accurate topographical survey of the section which it was proposed to drain, and the sum of $10,000 was to be raised for that purpose, one half by the counties concerned and one half by the Great Northern Railroad. Mr. Elliott was appointed chief engineer and Mr. Fanning, consulting engineer, and the convention then adjourned, to meet again in the following December after the survey should have been completed.

The convention met again at Crookston on December 8, 1886, and received an exhaustive report from the engineers who in the meanwhile had completed the topographical survey.[16] The report established the feasibility of draining this section, defined what ditches were needed, and indicated in a general way their location. It called for about 275 miles of main ditch costing about $750,000.[17] A committee of five members, one from each of the counties interested, was appointed to prepare and present to the legislature a general drainage law, such law to embody provisions for the "organization of drainage districts as municipal corporations; the equitable assessment of benefits and damages; the charging of lands benefited with cost of construction and maintenance of main drains and outlets, and also the damages to land injured; the construction of roads in connection with ditches; . . . . for the prosecution of work by bonds to be paid from the assessments of benefits; for the payment of those assessments by installments extending through a series of years; and the appointment of a state drainage commission, whose duty it shall be to approve and supervise in a general way the work of the districts. . . . ."[18] Another resolution also was unanimously adopted which called on Governor Hubbard and Governor-elect A. R. McGill, in their messages to the legislature, to call attention to the need of "careful and judicious legislation on the subject of drainage and the justice and necessity of a very liberal appropriation by the state to open up the obstructed river channels in" that section of the state.[19]

At the opening of the legislative session in the following January, Governor Hubbard expressed his willingness to comply with the request of the

[15] *Crookston Times*, July 3, 1886; J. J. Hill, *Highways of Progress*, 184-202; Drainage Commission, *Report*, 1899.

[16] J. J. Hill, *Highways of Progress*, 184-202. The legality of contributions by the counties towards the expenses of the topographical survey had been seriously doubted, but some had suggested that the county treasurer nevertheless honor the warrants of the county commissioners, in view of the need of a survey as a prerequisite to a demand for action by the legislature that was to meet in a month (*Crookston Times*, August 7, 1888). Later the legislature did authorize the counties of Kittson, Wilkin, Norman, Polk, and Marshall to contribute to such expenses, and legalized their action if they had already done so. (*Special Laws* 1887, ch. 222; 834; February 21, 1887).

[17] W. R. Hoag in Drainage Commission, *Report*, 1899.

[18] *Crookston Times*, December 12, 1886.

[19] *Ibid.*

Crookston convention and do what he could to aid in the drainage of the wet lands in the Red River Valley, but stated that the constitution stood in the way of state aid since section 10 of article 9 provided that "the credit of the state [should] shall never be given or loaned in aid of any individual association or corporation;" and section 5 of article 9 prohibited the state from contracting "any debts for works of internal improvement," or becoming a "party in carrying on such works except in cases where grants of land or other property shall have been made to the state specially dedicated by the grant to specific purposes." But he stated that appropriations "of portions of the internal improvement fund which is biennially distributed to aid in the construction of roads and bridges could very properly be devoted to drainage purposes as herein contemplated."[20] Governor McGill in his inaugural message to the same legislature took a substantially similar position, and then went on to urge the passage of a "well-considered" drainage law. He said: "The law on the subject now on the statute books has been found inadequate to the necessities, and should be radically amended or superseded by an act much more comprehensive and better adapted to our wants."[21] In spite of the work of the legislative committee that had been appointed by the Crookston Convention, the suggestion of Governor Hubbard, and the support of men from the Red River Valley, the legislature of 1887 made no general appropriation in aid of drainage in that section;[22] but it did do considerable in the way of improving the general laws relating to drainage. It elaborated the system that had been provided by the laws of 1883 for procedure through the county commissioners,[23] and provided that lands owned by the state should be subject to assessment for benefits in the same way as the lands of private persons,[24] this latter provision having been suggested by resolutions of the convention at Crookston.[25] The law of

[20] Governor Hubbard in his message of January 5, 1887, in Minnesota, *Executive Documents*, 1886-1887, 1:29.

[21] Governor McGill in his message of January 5, 1887, in *Executive Documents*, 1886-1887, 1:56.

[22] Drainage Commission, *Report*, 1899; *Legislative Manual* 1909, p. 314. Note the term "general" appropriation. It is true that in 1885, and up to as late as 1897, there were a few special appropriations. Thus in 1885, $700 was appropriated out of the internal improvement fund to be spent by the county commissioners of Renville County on drainage work. (*Special Laws*, 1885, ch. 69). Similar laws are cited below with the amounts, purposes for which to be spent, and authorities under which the work was to be done:

Laws, 1891, ch. 162, title P, County commissioners, Waseca. $800. Bridge and to drain lake.
Laws, 1891, ch. 162, title Z, County commissioners, Steele. $700. Road and to drain lake.
Laws, 1895, ch. 807. County commissioners, Pope. $3,000. Drainage.
Laws, 1897, ch. 103, title 114. Town supervisors in Otter Tail County. $75. Drainage.
Laws, 1897, ch. 103, title 86. Three men named. Town of Carlos, Douglas County, $100. Drainage.
Laws, 1897, ch. 103, title 94. Three men appointed by the Governor. Kandiyohi County. $100. Drainage.
Laws, 1893, ch. 241. Reimburse Becker County for money paid out in ditching state lands. $980. (Not strictly to be included here; really curative in character.)

[23] *Laws*, 1883, ch. 108.

[24] *Laws*, 1887, ch. 97, sec. 22.

[25] *Crookston Times*, December 12, 1886.

1883 had allowed appeals to be taken to the courts on four grounds alone, but the statute of 1887 allowed appeals on five grounds, now including the question whether the total costs exceeded the total benefits. Damages were to be paid out of the county treasuries, which were to be reimbursed from the assessments of benefits. The county commissioners were authorized to issue bonds to provide funds for drainage works, and might "transfer from the general revenue fund of the county to such drainage fund any surplus moneys . . . . that can be properly used for the purposes" of the drainage act.[26]

Up to this time there was no permanent drainage organization in the counties, or books, funds, or accounts. The county commissioners and other officers merely acted on each petition as it was presented, and supervised the construction of each ditch, and the matter was dropped. The law now provided that the county commissioners by majority vote at any regular meeting might organize the county into a drainage district. The county commissioners were to constitute a permanent board of drainage commissioners, and by that name should be a body corporate with power to sue and be sued, etc. They should have general supervision and control of all drainage matters pertaining to their district, subject to the provisions of this act of 1887. Their accounts as drainage commissioners, and the records of their meetings as such were to be kept separate from those as county commissioners. The county auditor was to be clerk of the drainage district, and the county treasurer its treasurer. Sub-drainage districts could be organized on petition of a majority of the owners of lands in a district having a common outlet, if owning one third of the lands affected. The board of drainage commissioners was to issue bonds for the benefit of such sub-drainage districts.[27] These two acts of 1887 were patterned after drainage laws in Illinois.[28]

Another statute of the same year provided that town supervisors might construct ditches on petition of not less than six legal voters owning real estate within one mile of the proposed drain. The supervisors were to examine the premises personally,[29] and the petitioners were to pay all damages assessed before they could open the ditch.[30]

Governor McGill in his message to the legislature of 1889 stated that these laws of 1887 met the needs of the state generally, but that more comprehensive measures were needed for the Red River Valley.[31] The farmers

[26] *Laws*, 1887, ch. 97.

[27] *Laws*, 1887, ch. 98.

[28] W. R. Hoag in Drainage Commission, *Report*, 1899, p. 16. *Crookston Times*, December 12, 1886, C. G. Elliott on the procedure in Illinois.

[29] *Laws*, 1887, ch. 99.

[30] This latter provision was added by ch. 168 of the Laws of 1889, which expressly repealed ch. 99 of the Laws of 1887, but substituted similar procedure.

[31] Governor McGill in his message of January 9, 1889 in *Executive Documents*, 1889, 1:37.

in that section were having difficulty with their wheat crops because of heavy frosts which were causing severe losses on account ot the wetness of the soil, and men from that section urged the legislature to give special assistance to those seeking to drain lands in that part of the state, but their efforts were unavailing in 1889 and 1891.[32]

Chapter 221 of the Laws of 1893 is worthy of considerable notice, not so much because of the things which it accomplished at that time, but because it was the germ of the present state drainage commission, which is of so great importance in the conduct of drainage operations in this state at the present time. By that act the legislature appropriated the sum of $25,000 a year for four years, to be expended in opening closed watercourses in eight counties of the Red River Valley. An amount equal to one fourth of this sum was to be contributed by the Great Northern Railway Company as an additional fund for the work, which was to be done under the supervision of a board of audit, consisting of the governor, secretary of state, one person named by the railroad company, and one person chosen by the chairmen of the boards of county commissioners of the counties concerned.[33] The railway company contributed its share of the money and its chief engineer served on the board of audit.[34] Further appropriations to continue the work of this commission were made by later legislatures.[35] By a subsequent act the board was to continue in existence until 1902.[36] And under a law of 1897, a board of state drainage commissioners was created. It consisted of three members appointed by the governor for three-year terms and serving without compensation. It was to have the care and control of all the ditches constructed under chapter 221 of the Laws of 1893, and chapter 164 of the Laws of 1895, that is, under the Red River Board of Audit; cause annual inspections of such works by a competent engineer; and require the county commissioners to keep them in repair and free from obstructions. Evidently this board was to attend to the details of the work while the Board of Audit was to attend to construction and financial matters.[37]

In 1901 the present state drainage commission was created, consisting of the governor, the secretary of state, and the state auditor, with practically the same powers and duties that it has at the present time.[38] Since these

[32] Governor Merriam in his message of January 9, 1889 in *Executive Documents*, 1889, 1:49; *Legislative Manual*, 1909, p. 314; Drainage Commission, *Report*, 1899.

[33] *Laws*, 1893, ch. 221.

[34] *Legislative Manual*, 1909, p. 314; Governor Nelson in his message of January 9, 1895, *Executive Documents*, 1894, 1:29.

[35] *Laws*, 1895, ch. 164; *Legislative Manual*, 1909, p. 314.

[36] *Laws*, 1897, ch. 142.

[37] *Laws*, 1897, ch. 318.

[38] *Laws*, 1901, ch. 90.

[39] Thus the approximate number of pages of drainage statutes enacted by the legislatures of 1905, 1907, 1909, and 1911 respectively are 46, 90, 50, and 43. In the session of 1907 there were fourteen separate acts passed relating to drainage.

powers and duties will be discussed in a later chapter dealing with the existing system and procedure, it is unnecessary to give them in detail at this point.

From 1901 to the present date every session of the legislature has seen the enactment of a constantly increasing number of drainage laws, because of a steadily increasing demand for lands in this state and a growing realization of the many advantages of land drainage and its profitableness. These statutes have made a great many changes in the laws as to details, and are so voluminous that to attempt to trace them in any detail would serve no purpose unless it would be to confuse the reader. Consequently, this discussion will be confined to a very brief reference to them. A list of such statutes may be found in Appendix 1, for the convenience of any person who may wish to pursue the matter further.[39]

An act of 1901, relating to county drainage, collected together in one act the previous enactments as to procedure through the county commissioners.[40] This was amended by a law of 1902, which provided a procedure to be followed whenever it was desired to extend a ditch into more than one county, such ditches to be constructed under the supervision of the judge of the district court of the judicial district in which such counties are located.[41] It will be remembered that the drainage act of 1883 attempted to meet the demand for machinery that could be used in constructing drains through several counties by providing for joint action by the county officers, who were to follow the procedure used in the establishment of county drains so far as possible. Doubtless such a plan was cumbersome, and it was difficult to secure prompt and harmonious action by the many officials involved, in the same way that a similar difficulty was met with in the procedure under the law of 1879 relating to action by several boards of town supervisors. Of course the revised laws of 1905 contained a compilation of all existing unrepealed laws on the subject,[42] but many details considered necessary by the legislature were omitted in the revision. Chapter 230 of the session laws of 1905 supplied these details and is practically the latest complete statute on the subject of drainage.[43] By an act of 1909 a procedure through township supervisors was authorized.[44] In addition to these acts there have been several curative acts.

To summarize briefly, then, the following were the chief steps in the development of drainage legislation in Minnesota:

1. Private drainage corporations authorized, 1858.
2. Procedure through justice of the peace, 1866.

[40] *Laws*, 1901, ch. 258.
[41] *Laws*, 1902, ch. 38.
[42] *Revised Laws*, 1905.
[43] *Laws*, 1905, ch. 230.
[44] *Laws*, 1909, ch. 127.

3. Drainage for highway purposes alone, with procedure through town supervisors, 1874.
4. For agricultural purposes, with procedure through town supervisors, 1877.
5. County commissioners may have town boards act together, if ditch is to extend into more than one town, 1879.
6. Procedure through county commissioners, 1883.
7. Permanent county drainage districts, 1887.
8. Red River Valley Board of Audit, 1893.
9. State drainage commission, 1901.
10. Judicial ditches, 1902.
11. Complete laws, chapter 230, 1905.
12. Procedure through town supervisors, 1909. (Revival of old procedure; similar, as to agency used, to law of 1877.)

Thus, we may trace the origin of the use of those agencies that are at the present time engaged in drainage work back to the following dates: the town, 1877; the county, 1883; the state drainage commission, 1893; the district court, 1902.

There is one fact that is apparent from the development of drainage laws in Minnesota, and that is, that, as drainage work has been developed, it has been found necessary to extend the ditches over larger and larger areas without regard to the artificial boundary lines of towns, counties, or judicial districts, so that the use of governmental agencies having ever greater territorial jurisdictions and more power and authority has been found to be advisable. Whether it is either desirable or probable that any still more powerful agent be used, will be discussed in another chapter.

CHAPTER VI

DRAINAGE PROCEDURE IN MINNESOTA

In Minnesota public drainage ditches may be established by procedure through any one of four agencies: (1) the town supervisors, (2) the county commissioners, (3) the district courts, (4) the state drainage commission. The steps to be taken in the construction of public drainage works through action by the county commissioners, are much the same as those necessary for the establishment of ditches by means of other governmental bodies, and the general outline and underlying principles of the county drainage law are typical of the drainage statutes of the state in general; so that this chapter will contain first a description of the procedure followed at the present time in establishing county drains. It will then point out the principal differences between such procedure and that followed in the laying-out of town, judicial, and state ditches, as well as the general principles embodied in the drainage statutes and decisions of the state courts relative to procedure in general.

Before the county board can establish any ditch or drain, a petition must be filed with the county auditor, signed by one or more of the landowners whose lands are liable to be affected by, or assessed for, the expense of the construction of the same, or by the supervisors of any township or the officers of the council of any city or village, or by the duly authorized agent of any public institution, corporation, or railroad, whose lands are liable to be affected by, or assessed for, the expense of the construction of the proposed ditch, or by the state board of control. Such petition must set forth the necessity of such a drain and state that it will be of public benefit or promote the public health, and must also contain a description of the proposed starting-point, routes, and termini.[1] It must be accompanied

[1] In the petition it is sufficient that the starting-point, course, and terminus be stated with approximate accuracy, the board in ordering the construction of a ditch being finally guided by the description as contained in the surveyor's report. State *v.* Polk County, 87 *Minnesota*, 325 (1902); State *v.* Lindig, 96 *Minnesota*, 419, 421 (1903); Johnson *v.* Morrison County, 107 *Minnesota*, 87, 89 (1909). See State *v.* Watts, 116 *Minnesota*, 326 (1911). Showing of petition as to health and public benefit need not be in language of statute. State *v.* Watts, 116 *Minnesota*, 326, 327 (1911). Technical nicety of description in ditch proceedings not required, nor language such that every layman may trace the ditch upon the ground. Dictum in Slingerland *v.* Grant County, 113 *Minnesota*, 214, 216 (1911). A petition need not describe the land by subdivisions to correspond with individual ownership. If an entire section is within a district it may be described as a section, though the subdivisions are owned by different persons. State *v.* Quinn, 108 *Minnesota*, 528 (1909). The proceedings are purely statutory. Lager *v.* Sibley County, 100 *Minnesota*, 85, 86 (1907), and in invitum. Curran *v.* Sibley County, 47 *Minnesota*, 313 (1891); and in rem. McMillan *v.* Freeborn County, 93 *Minnesota*, 16, 22 (1904).

by a bond conditioned to pay all expenses in case the county board shall fail to establish the ditch petitioned for.[2]

Notice of the filing of the petition, and of the time and place of the hearing thereon, must then be given by the county auditor by publication for three successive weeks in a newspaper published and printed in that county and by posting for at least three weeks in three public places in each township where the proposed work is located and at the door of the courthouse. Printed copies must also be mailed to all non-residents of the county whose lands lie within two miles on either side of the routes specified in the petition and whose addresses are known to the auditor or can be ascertained by inquiry at the county treasurer's office.

The county board, when it is satisfied that all of these steps have been taken, appoints "a competent and experienced civil engineer,"[3] whose duty it is to make a survey of the line of the proposed drain, estimate the number of yards of earth to be excavated, the cost of excavation per yard and of construction work considered necessary, such as flumes and masonry, and the total cost of laying out the whole work, including preliminary expenses. The engineer is also to furnish the general specifications for doing the work, and to make out a form of contract which shall give him the right, with the consent of the county auditor, to modify his plans and specifications as the work proceeds, "provided that no changes are made that will substantially impair the usefulness of any part of the ditch, or substantially alter its original character or increase its total cost by more than ten per centum." Under certain circumstances the engineer may vary somewhat from the line specified in the petition. In case the route proposed is along public highways, he is to prescribe such a disposition of the excavated matter as will improve such highways; and, so far as practicable, he is to locate the ditch on division lines between lands owned by different persons, and to avoid constructing it diagonally across lands, but he is not to "sacrifice the general utility of the ditch to avoid diagonal lines." Before entering on his duties, the engineer is required to give bonds to the county in the sum of $5,000 for the use of the county, or for the indemnification of all persons injured by any negligence or malfeasance on his part while acting in the establishing of the ditch. The results of the engineer's work are to be set

[2] Where petitioners did not sign bond and there was failure to establish ditch, they were not liable for preliminary expenses paid by county even though they signed petitions. McLeod County *v.* Nutter, 111 *Minnesota*, 345 (1910). Where five petitioners for ditch signed bond as principals each is liable to pay one fifth of preliminary expenses, regardless of the benefit which it appears from viewers' report he would have received had ditch been constructed. Gugisberg *v.* Eckert, 101 *Minnesota*, 176 (1907) (bond under *Laws*, 1901, ch. 258). Obligors not liable where order establishing ditch was set aside for irregularity; bond not designed to indemnify county against failure of its officers to comply with the law (bond under *Laws*, 1901, ch. 258). Freeborn County *v.* Helle, 105 *Minnesota*, 92 (1908).

[3] *Laws*, 1905, ch. 230, sec. 3; amended by *Laws*, 1907, ch. 367, sec. 1, *Laws*, 1909, ch. 469, sec. 2, *Laws*, 1911, ch. 384, sec. 1. (*Laws*, 1905, ch. 311, was repealed by *Laws*, 1907, ch. 367, sec. 11.)

forth in a detailed and tabulated report to be made to the board of county commissioners, and filed with the county auditor.[4]

At the same session of the county board at which the engineer is appointed, or within at least ten days thereafter, the board selects three resident freeholders of the county, "not interested in the construction of the proposed work, and not of kin to any of the parties known to be interested therein," to act as viewers. These viewers then make a tabular statement showing the names of the owners of each tract to be benefited or damaged, the description of each tract benefited or injured, the amount of damage or benefit to each, the damage, if any, to riparian rights, the estimated benefits to public and corporate roads, roadbeds, or railroads, the damages awarded to natural and artificial persons, and the total estimated benefits in respect to the entire ditch and branches. They also report "whether or not, in their opinion, the estimated expense of the construction of such ditch, including the damages awarded therefor, are greater than the utility of the proposed ditch, or that the construction of such ditch is impracticable for any reason, stating the reason why it should not be constructed."[5] All lands benefited are to be assessed in proportion to the benefits received from the construction of the ditch, whether or not it passes through such lands; and all lands owned by the state or any of its departments are liable to assessment in the same way as taxable property.[6] The report of the viewers must be filed with the county auditor, and all their duties performed within thirty days from their first meeting,[7] which meeting must be held within fifteen days after the filing of the engineer's report.[8]

Upon the filing of the viewers' report, a special meeting of the board of county commissioners is held, at least three weeks' notice having been given in much the same manner as the notice of the petition and of the first meeting of the board. At this second meeting the county board hears and considers the petition, and the reports of the engineer and viewers. All per-

[4] *Laws*, 1905, ch. 230, sec. 4; amended by *Laws*, 1911, ch. 384, sec. 2. *Laws*, 1905, ch. 230, sec. 5; amended by *Laws*, 1909, ch. 469 sec. 3. A change by the engineer in starting point even if not authorized by *Laws*, 1905, ch. 230, sec. 4, is no defense to proceedings to obtain judgment for assessment lien. State *v.* Tuck, 112 *Minnesota*, 493 (1910), following State *v.* Johnson, 111 *Minnesota*, 255 (1910). For authority of engineer to lay out proposed ditch along practicable lines, see State *v.* Watts, 116 *Minnesota*, 326 (1911). In State *v.* District Court, 114 *Minnesota*, 424 (1911) (a judicial ditch) court held notices of first hearing properly posted, although in only one town, it appearing that proposed ditch was wholly located in that town.

[5] *Laws*, 1905, ch. 230, sec. 6; amended by *Laws*, 1909, ch. 469, sec. 4. Provisions directing board to appoint viewers within specified time are directory merely, and neglect strictly to comply therewith does not invalidate the proceedings. McMillan *v.* Freeborn County, 93 *Minnesota*, 16 (1904), under *Laws*, 1901, ch. 258.

[6] *Laws*, 1905, ch. 230, sec. 7; amended by *Laws*, 1905, ch. 469, sec. 5. The sum of $5,000 per year, beginning with 1905, was appropriated out of the general revenue fund of the state to pay assessments against state lands which might be levied under authority of the above statutes. *Laws*, 1905, ch. 230, sec. 24; *Laws*, 1909, ch. 469, sec. 5.

[7] Delay in viewers' report necessarily caused by high water, inclement weather, or unavoidable accident may be excused by county commissioners. *Laws*, 1905, ch. 230, sec. 8.

[8] *Laws*, 1905, ch. 230, sec. 6; amended by *Laws*, 1909, ch. 469, sec. 4.

sons interested may appear before the county commissioners and be heard by them. The county board may resubmit to the engineer or viewers for reconsideration the matters originally reported upon by them, or amend their respective reports.[9] If the board finds that the engineer's and the viewers' reports, and all other proceedings in the matter have been made and had in accordance with the statutory provisions, and that the estimated benefits to be derived from the construction of the work are greater than its total costs, including damages awarded, and that such damages and benefits have been duly awarded and assessed, and that the proposed work will be of public utility or benefit or promote the public health, and that the reports are complete and correct, it establishes the ditch as specified in the report of the civil engineer, and confirms the report of the viewers.[10]

In its final order establishing the ditch the county board is limited to the description thereof as set forth in the petition, subject to such reasonable departures in the course, distance, and termini as are necessary to render the improvement of practical utility. An extension of a proposed ditch for a distance of seven miles, for example, beyond the terminus named in the petition, is unauthorized where the length of the ditch as originally petitioned for is only four miles.[11] A radical departure by the engineers and county commissioners from the line of a public ditch as demanded in the petition may render the order of the county commissioners laying out the ditch and all subsequent proceedings void, and the abandonment of terminus as petitioned for and its establishment on the land of a private owner when the petition designates a proper outlet is unwarranted.[12] And if waters are to be diverted from their natural course, the ditch must follow the general direction of the water-course and terminate therein whenever it is practicable to do so; although there may be a reasonable departure where such is necessary to secure a practicable drain.[13] The order establishing the ditch must in itself, or by reference to the viewers' report, which is itself sufficient, definitely locate the ditch, by giving the proper starting point, route, and terminus.[14]

[9] *Laws*, 1905, ch. 230, sec. 9; amended by *Laws*, 1907, ch. 367, sec. 21, and *Laws*, 1911, ch. 384, sec. 3. Heinz *v.* Buckham, 104 *Minnesota*, 389 (1908).

[10] *Laws*, 1905, ch. 230, sec. 10; amended by *Laws*, 1911, ch. 384, sec. 4. So also the court in judicial proceedings at second hearing is required to determine the utility of the proposed ditch. And the fact that the petitioners have expended money on faith of the first determination will not prevent the court from differing in its conclusion at the second and final hearing from that at the first or preliminary hearing and determination. Wheeler *v.* Almond, 110 *Minnesota*, 503 (1910).

[11] Lager *v.* Sibley County, 100 *Minnesota*, 85 (1907), under *Laws*, 1905, ch. 230.

[12] Jurries *v.* Virgens, 104 *Minnesota*, 71 (1908), under *Laws*, 1901, ch. 258, sec. 3.

[13] State *v.* Baxter, 104 *Minnesota*, 364 (1908), under *Laws*, 1905, ch. 230, sec. 1.

[14] Johnson *v.* Morrison County, 107 *Minnesota*, 87 (1909), under *Laws*, 1905, ch. 230, sec. 10. Order laying out ditches sustained on certiorari against objection that the drainage district was unlawfully split; that as good or better drainage could be obtained by other routes at less expense, and with less, if any, damages; and that the ditch ordered was inadequate to its responsibilities. State *v.* Buckham, 108 *Minnesota*, 8 (1909). See also Slingerland *v.* Conn, 113 *Minnesota*, 214 (1911), State *v.* Watts, 116 *Minnesota*, 326 (1911), Gourd *v.* Morrison County, 118 *Minnesota*, 294 (1912). For case relating to sufficiency of evidence to support certain finding that certain lands were damaged, see Backus *v.* Conroy, 104 *Minnesota*, 242 (1908).

Within ten days after the filing in the office of the county auditor of the order establishing the ditch, such auditor sells the jobs of digging and constructing the entire work either as one job, or in linear sections of one hundred feet each. Notice of the letting of the work, and requests for bids must be published in the official newspaper of the county for three successive weeks, but no bid is to be entertained which exceeds the estimated cost by more than thirty per cent. The engineer attends to the letting of the work, and no bid can be accepted by the auditor without the approval of such engineer as to the compliance of the bid with the plans and specifications. The auditor enters into the contract with the lowest responsible bidder,[15] but such contract must require the work to be done according to the report, plans, and specifications of the engineer, and subject to his approval and that of the county auditor, and must be drawn to the satisfaction of the engineer and of the county attorney.[16] The contractor must furnish a bond in the penal sum of not less than the contract price, conditioned that he will faithfully perform his contract and pay all damages which may accrue by reason of the failure to complete the work in the manner and within the time required in the contract. Of course the contract by the auditor is in the name of the county.[17] On compliance with certain statutory conditions, the contract may be altered, or the time for completing the drain extended. In case of default, the jobs may be resold.[18] Whenever any contractor has completed his job, the work is inspected by the engineer, and, if he finds that the contract has been performed according to the plans and specifications, he reports that fact to the county board and gives the contractor a certificate stating that such work has been properly finished. Certificates showing partial performance may also be issued during the progress of construction under certain statutory restrictions, one being that those for work done shall not exceed seventy-five per cent of its total value, nor those for materials or supplies more than fifty per cent of their total value.[19] These certificates become prima facie evidence of the completion of the work only after approval by the county board, and they may be exchanged for warrants due and payable at once out of the general ditch fund of the county.[20]

[15] *Laws*, 1905, ch. 230, sec. 4.

[16] *Laws*, 1905, ch. 230, sec. 15; amended by *Laws*, 1911, ch. 384, sec. 7, and *Laws*, 1911, ch. 568, and *Laws*, 1913, ch. 578, sec. 1.

[17] *Laws*, 1905, ch. 230, sec. 14. Landowner is entitled to sue on a bond of contractor, (under *Laws*, 1902, ch. 38, sec. 10), Eidsvik *v.* Foley, 99 *Minnesota*, 468 (1906). Owners of land in a drainage district are not entitled to recover from the contractor and his bondsmen for a loss of profits arising from failure to complete ditch within the time specified (under *Laws*, 1901, ch. 258), Grams v. Murphy, 103 *Minnesota*, 219 (1908).

[18] *Laws*, 1905, ch. 230, secs. 15 and 16; amended by *Laws*, 1911, ch. 384, sec. 7, *Laws*, 1913, ch. 568, and *Laws*, 1913, ch. 578, sec. 1. *Laws*, 1913, ch. 22, secs. 1 and 2.

[19] There is an exception as to maximum percentages with reference to contracts involving more than $30,000.

[20] *Laws*, 1905, ch. 230, sec. 17; amended by *Laws*, 1909, ch. 469, sec. 6, *Laws*, 1911, ch. 384, sec. 13, and *Laws*, 1913, ch. 567, sec. 1. Under the act of 1887 it has been held that the authority

When damages are awarded to any person or corporation in excess of benefits, warrants are issued at the expiration of the time allowed for appeals to the courts, and these warrants become due and payable immediately after the letting of the contracts. In order to meet the expenses of constructing the drain, the county commissioners issue the bonds of the county, in terms not exceeding twenty years, and bearing interest at the rate of not more than six per cent per annum. The proceeds derived from the sale of these bonds are placed in, and constitute the general ditch fund of the county.[21] Thus, the moneys used for the payment of damages awarded and of the warrants which are given to the contractor in exchange for the engineer's certificates of completed work are derived in the first instance from the sale of county bonds.

As soon as possible after the letting of the contract, the county auditor

of the county surveyor is limited to inspecting the work of the contractor, when completed, and, if he finds the same in accordance with the specifications of the viewers, to accept it and give the contractor a certificate of acceptance, and that he has no right to authorize the contractor to incur extra expenses which are not embraced within the original specifications; that the cost of ditch work must be assessed against property benefited so that the board has no authority to incur any liability on behalf of the county for material or services; and that even though the board accepts a ditch as complete, knowing that the contractor by direction of the county surveyor has spent money not embraced by specifications yet such acceptance does not make the county liable therefor. Bowler *v.* Renville County, 105 *Minnesota,* 26 (1908). Partial payments may be made without approval of county board (under *Laws* 1905, ch. 230, sec. 17). Moody *v.* Brasie, 104 *Minnesota,* 463 (1908). Mere irregularity in the award of contract has been held not to defeat a recovery against the county. Interstate Drainage and Investment Company *v.* Freeborn County, 158 *Federal Reports,* 270 (1907). For case holding that the engineer's estimate is not the basis of the bid; that an action by contractor lies against the county to reform a contract for mutual mistake of parties thereto, such action not being considered as one against the county for an error by one of its officers in the exercise of governmental functions, see Mulgrew *v.* Freeborn County, 112 *Minnesota,* 5 (1910). In awarding contract to "lowest responsible bidder" auditor is not limited to consideration of financial responsibility of bidder but may exercise sound discretion and consider fitness and ability of bidder to do the particular work, so that award to one not lowest bidder may be sustained if sufficient reason therefor. Kelling *v.* Edwards, 116 *Minnesota,* 484 (1912). Approval of certificates is condition precedent to issue of warrants by auditor and board can not be controlled in approval by mandamus, contractor's remedy being a suit on the contract. State *v.* Clarke, 112 *Minnesota,* 516 (1910). In such case contractor is not required to resort to certiorari to review refusal of board to approve; *Revised Laws,* 1905, sec. 620, requiring presentment to board of claims against county as condition precedent to suit against county is not applicable to the final payment due contractor in drainage proceedings. Merz *v.* Wright County, 114 *Minnesota,* 448 (1911).

[21] *Laws,* 1905, ch. 230, sec. 18; amended by *Laws,* 1907, ch. 367, sec. 3 and *Laws,* 1909, ch. 469, sec. 7. The bonds issued by the county are the direct and general obligations of the county, and its auditor and board can not be restrained from issuing bonds in such form on the ground that the legislature intended the lands assessed to be the security, and not the county itself, or that if the legislature intended the latter it had no power to do so. "To bring the best price and a ready sale, bonds must be issued by an obligor whose responsibility is readily ascertainable and undoubted. . . . . Prospective purchasers of bonds might well be turned away, if the law is that the only security is the assessments against benefited property." And as to the power of the legislature the court said: "The construction of drainage ditches being the exercise of a governmental function, delegated to the counties of the state for the promotion of public health, welfare, and utility, there ought to be no doubt that all the property within the county may be subject to taxation to provide the funds therefor. That most, or part, of this burden is laid on property specially benefited is no reason why the owners of other property thus relieved should have any warrant for claiming that the law violates any of their constitutional rights. In other words, the legislature may provide different taxing districts within a county, and is not bound by governmental subdivisions therein." Van Pelt *v.* Bertilrud, 117 *Minnesota,* 50 (1912).

makes out a tabulated statement showing (1) the names of the owners of the lands, roads, and railroads benefited, (2) a description of these lands, (3) the number of acres benefited in each tract, (4) the amount of benefits to each tract of land, road, and railroad, as well as of the damages thereto, (5) the amount that each of these lands, roads, and railroads so benefited will be required to pay towards the cost of constructing the drain.[22] This statement is then filed with, and recorded by, the register of deeds of the county, and the amount which each tract of land, public or corporate road or railroad, is liable for, together with interest thereon not exceeding six per cent, constitutes a paramount lien on such property until paid, and takes precedence of all mortgages, charges, incumbrances, or other liens of any kind.[23] These liens are to be paid off in ten equal annual installments, but the county board in its discretion may provide for fifteen of such payments. These liens are collected at the same time of the year and in the same manner as real estate taxes,[24] except that in the case of railroads they are collectible in the same way as personal taxes.[25] Thus, the bonds of the county are issued only for the purpose of supplying the funds that are needed at once for the construction of the ditch and the payment of damages, and for the purpose of lightening the burden of persons assessed for benefits by enabling them to pay such obligations in installments. The bonds issued are retired by the persons for whose benefit they were originally issued.

[22] *Laws*, 1905, ch. 230, sec. 19.

[23] *Laws*, 1905, ch. 230, sec. 20. The amount charged against each tract of land bears interest at not more than six per cent as fixed by the county board which must make the interest rate the same as that on bonds issued. (*Laws*, 1905, ch. 230, sec. 11; amended by *Laws*, 1911, ch. 384, sec. 12).

[24] *Laws*, 1905, ch. 230, sec. 22; amended by *Laws*, 1909, ch. 469, sec. 8.

[25] *Laws*, 1905, ch. 230, sec. 25; amended by *Laws*, 1909, ch. 469, sec. 9. The duty of the county auditor to file the lien statement is mandatory, and no other and speedy remedy at law being available he may be compelled by mandamus to file such statement, or correct an insufficient one so as to protect the county. State *v.* Johnson, 111 *Minnesota*, 10 (1910). (Same case held a delay of four years in filing such statement was not fatal to the rights of the county.) It has been held under *General Statutes*, 1894, secs. 7810, 7811, that the lien attaches at the time provided in the statute, and the privilege given the landowner to pay the same in installments does not change the character of such lien, nor control the time when the lien takes place, which is upon the filing of the lien statement by the auditor; that the provisions of *General Statutes*, 1894, sec. 1623 for the attachment of liens for ordinary taxes as between the state and the landowner as well as between grantor and grantee, do not affect or control the assessments provided for in the state drainage laws by virtue of the fact that such assessments are collected in the same manner as ordinary taxes; and that the liens provided for in sec. 1623 and in sec. 7811 are distinct, created for different purposes, attach at different times, and impose different conditions upon the landowner under a covenant against incumbrances upon the sale of the land by him. Clapp *v.* Minnesota Grass Twine Company, 81 *Minnesota*, 511 (1900). And under *Laws*, 1901, ch. 258, it was held that recording of assessment list and statement is essential to the creation of a lien. Meeker County *v.* Schultz, 110 *Minnesota*, 405 (1910). Prior to May 20, 1908, land of the United States entered as a homestead, but not finally proved as such, was not subject to the lien of a drainage assessment. State *v.* Johnson, 111 *Minnesota*, 255 (1910). Where in proceedings to enforce a delinquent tax on real estate a defense is made to an installment for ditch assessment included therein on ground that proceedings establishing ditch are void, and a judgment is entered discharging land from such tax, such judgment is res judicata as to the enforceableness of subsequent installments; and landowner can compel county to remove cloud on his title raised by the apparent lien of the whole ditch assessment. Lindberg *v.* Morrison County, 116 *Minnesota*, 504 (1912).

It is evident that great care is necessary in determining the principles to be followed in assessing land for benefits received, because of constitutional restrictions which might result in the courts holding the statutory provisions relative to such assessments invalid as inconsistent with the constitution of the state. The constitutional amendment authorizing the legislature to empower "municipal corporations" to levy assessments for local improvements, without regard to the cash valuation of property assessed, has been held to authorize such legislation with respect to the powers of counties in drainage matters, so that costs of drains may be secured by assessments in accordance with benefits received.[26] And, as we have already pointed out, the legislature may, in the enactment of laws providing for public improvements in the interests of public health, convenience, and comfort, provide that the cost and expense of such improvements be assessed against lands benefited and improved thereby, such assessments not being open to the objection that they result in unequal taxation.[27] But a statute providing in effect, that the owners of lands benefited by the construction of a new ditch and its connection with a ditch already established, for which their lands were not assessed, shall pay into the county treasury the same proportion of benefits received by their lands, that the lands assessed for the original ditch were forced to pay, is unconstitutional, since it deprives a class of landowners of their property for a public purpose without any compensation and without due process of law.[28] So that it is clear that great care must be taken in drawing and applying rules relating to assessments so as to avoid any arbitrary method of determining the amount of benefits received by an individual landowner. Although all lands benefited by a given ditch in whole or in part are to be charged in proportion to actual benefits received, yet it is not necessary in order to assess a given tract of land that the ditch pass through such tract; it is sufficient that it receives a benefit. But only *direct* benefits from the ditch in question can be considered, and not the benefits which the land may or will receive after some other and different ditch is constructed.[29] An allowance should be made for any damage to the riparian rights of the landowner against whom an assessment is made, as well as for any private ditch which he may have already constructed, and which can or will be used in the public ditch so as to decrease the cost of the latter.[30] The amount any land shall be liable for on account of the drain shall in no case exceed the benefits which will accrue thereto from the building of

[26] Dowlan *v.* Sibley County, 36 *Minnesota*, 430 (1887).

[27] Lien *v.* Norman County, 80 *Minnesota*, 58 (1900). See also Swenson *v.* Hallock, 95 *Minnesota*, 161 (1905) and Gourd *v.* Morrison County, 118 *Minnesota*, 294 (1912).

[28] Lyon County *v.* Lien, 105 *Minnesota*, 55 (1908). *Laws*, 1907, ch. 48, sec. 40. See also p. 58 *supra* and notes thereto.

[29] *Laws*, 1905, ch. 230, sec. 7; amended by *Laws*, 1909, ch. 469, sec. 5.

[30] *Laws*, 1905, ch. 230, sec. 6; amended by *Laws*, 1909, ch. 469, sec. 4.

such drain.[31] After the ditch has been opened, it is kept in repair and free from obstructions by the county board, the costs of such work being paid out of the general revenue funds of the county, which funds are reimbursed by assessments on lands charged for the construction of the drain in the same proportion as the original assessments.[32] And the county commissioners, after a report from viewers, may compensate persons whose lands have been damaged subsequent to the construction of a ditch, who were not paid for such damages in the original award of damages, provided a petition to that effect is presented to the board within six years after the completion of the ditch.[33] Ordinary repairs may be made without any notice.[34]

The statutes relating to the procedure to be followed in the establishment of ditches contain many provisions designed to protect landowners; and such owners have been further safeguarded in their rights by the recognition on the part of the courts of certain remedies under the common law, or without express provision therefor in the drainage statutes themselves. Furthermore, it is worthy of note, that the rule that the public drain acts of the state are to be liberally construed[35] so as to promote the reclamation of swamp lands, does not mean that exact compliance with the statutory provisions relating to such steps in procedure as notices, petitions, and public hearings, can be to any degree dispensed with; on the contrary, the courts have held that all statutory provisions which are designed for the protection of landowners must be strictly complied with, and failure to do so may render the proceedings void as to owners whose rights have been prejudiced.[36] Thus, it has been held that a petition in proper form is a jurisdictional prerequisite to the authority of the county commissioners to entertain any pro-

[31] *Laws*, 1905, ch. 230, sec. 38. The right-of-way of a railway company, paying a gross earnings tax in lieu of all taxes and all assessments as provided in *Special Laws*, 1873, ch. 111, is exempt from assessments for special benefits thereto from a public ditch. Patterson *v.* Chicago, Milwaukee and St. Paul Railway, 99 *Minnesota*, 454 (1906).

[32] *Laws*, 1905, ch. 230, sec. 26; amended by *Laws*, 1907, ch. 367, sec. 4, and *Laws*, 1909, ch. 469, sec. 10, and *Laws*, 1911, ch. 384, sec. 8, and *Laws*, 1913, ch. 179, sec. 1. Part of *Laws*, 1905, ch. 230, sec. 26 was held unconstitutional in State *v.* McGuire, 109 *Minnesota*, 88 (1909). But this was as to enlargement of ditches without notice, and not mere repairs. Consequently above statement still holds true. Wilful or negligent obstruction of diches or injury thereto is a misdemeanor. *Laws*, 1905, ch. 230, sec. 43; amended by *Laws*, 1907, ch. 367, sec. 7. But in a prosecution for obstructing a drain, it was held error to admit an order establishing the drain since it was void because of insufficiency of description. State *v.* Lindig, 96 *Minnesota*, 419 (1905). An action will lie against a town for obstructing a ditch. Rasmussen *v.* Hutchinson, 111 *Minnesota*, 457 (1910). Since the power to assess property for local improvements is a continuing one, it may be exercised to cover the cost of maintaining a ditch. McMillan *v.* Freeborn County, 93 *Minnesota*, 16 (1904).

[33] *Laws*, 1905, ch. 230, secs. 39-41.

[34] State *v.* McGuire, 109 *Minnesota*, 88 (1909). See also State *v.* McGuire, 114 *Minnesota*, 281 (1911).

[35] *Laws*, 1905, ch. 230, sec. 47. *Laws*, 1907, ch. 470, sec. 33. State *v.* Polk County, 87 *Minnesota*, 325 (1902). State *v.* Isanti County, 98 *Minnesota*, 89 (1906). Backus *v.* Conroy, 104 *Minnesota*, 242, 246 (1908). State *v.* Baxter, 104 *Minnesota*, 364, 366 (1908). Interstate Drainage and Investment Company *v.* Freeborn County, 158 *Federal Reports*, 270 (1907).

[36] Curran *v.* Sibley County, 47 *Minnesota*, 313 (1891). Lager *v.* Sibley County, 100 *Minnesota*, 85 (1907). See also McMillan *v.* Freeborn County, 93 *Minnesota*, 16 (1904).

ceedings for the establishment of a ditch;[37] that the notice of the time set for the hearing of the petition and of the report of the viewers is likewise jurisdictional, and must be given in accordance with the provisions of the statutes before the board can proceed; that the publication of the notice for three weeks or twenty-one days must be fully completed before the day fixed for the hearing;[38] and where, at the first hearing, an engineer and viewers have been appointed and reports required from them, notice of the second and final hearing must be given and an opportunity afforded to parties interested to support by competent evidence valid objections to the laying-out of the ditch.[39] And the statutory provisions relating to parties are to be liberally construed, so that the right of landowners affected to appear before the county board and be heard by it is not confined to those who are strictly parties to the drainage proceedings, but extends to landowners with a well-grounded claim for damages, resulting from the construction of the drain even though it may not certainly appear that such damages are recoverable at law.[40]

Not only are landowners protected by the necessity for proper petitions, notices, and hearings, but they may also protect and enforce their rights by appeals to the courts of the state including the supreme court; by injunctions; and by certiorari. The statute provides that any person or corporation aggrieved thereby may appeal from an order of the county commissioners determining either of the following matters: (1) the amount of benefits to any tract of land or any public or corporate road or railroad, (2) the amount of damages allowed to any person, persons, or corporation, or assessed to any tract of land, (3) refusing to establish a proposed ditch. As might be expected, notice of the appeal, and bond conditioned duly to prosecute the appeal and pay all costs adjudged against the appellant and to abide the decision of the court, must also be filed. Any person deeming himself aggrieved in the assessment of his damages or the estimate as to his benefits may demand a jury trial to determine the correctness of such assessments and allowance. The issues raised by such a demand stand for trial at the next term of the district court, and take precedence over all matters of a civil character in that court.[41] Appeals from any final appealable order, except the order establishing the ditch, may be carried to the

[37] State *v.* Polk County, 87 *Minnesota,* 325 (1902). State *v.* Watts, 116 *Minnesota,* 326, 328 (1911). Johnson *v.* Morrison County, 107 *Minnesota,* 87, 88 (1909).

[38] Curran *v.* Sibley County, 47 *Minnesota,* 313 (1891). Johnson *v.* Morrison County. 107 *Minnesota,* 87, 89 (1909). State *v.* District Court, 114 *Minnesota,* 424 (1911).

[39] Heinz *v.* Buckham, 104 *Minnesota,* 389 (1908), (under *Laws,* 1907, ch. 448).

[40] State *v.* Isanti County, 98 *Minnesota,* 89 (1906). See also Billsborrow *v.* Pierce, 101 *Minnesota,* 271 (1907).

[41] *Laws,* 1905, ch. 230, sec. 12; amended by *Laws,* 1911, ch. 384, sec. 6. An appeal from an order of a county board laying out a ditch, does not bring up for review the question of whether the board has exceeded its authority by establishing the ditch so as to drain a public meandered lake. Dressen *v.* Nicollet County, 76 *Minnesota,* 290 (1899). (This was under *Laws,* 1887, ch. 97, sec. 11.) An informal notice of appeal and bond under *Laws,* 1887, was sustained in Ander-

supreme court of the state by filing the notice of appeal and the bond required as in civil actions upon an appeal to that court.[42] Where no provision is made for an appeal, certiorari is a proper remedy to secure a judicial review of drainage proceedings.[43] Thus, it has been held that, since the statutes provide no appeal from an order of the county commissioners laying out a ditch, certiorari may be resorted to as a remedy by the landowner.[44] And an injunction will lie to restrain drainage proceedings where a landowner is without an adequate legal remedy;[45] but if he has such a remedy, the rule is otherwise, and he can not resort to the use of injunction.[46] If he uses neither certiorari, injunction, nor his right to appeal upon

son *v.* Meeker County, 46 *Minnesota,* 237 (1891). A notice of appeal, otherwise specific, directed to a county board, is sufficient in form, and, after bond filed, operates to perfect an appeal to the district court from an order of said board dismissing an application for the establishment and construction of drainage ditches made pursuant to *Laws,* 1901, ch. 258, as amended, and vests the district court with jurisdiction. This jurisdiction upon appeal extends to a trial de novo of all issues, both of fact and law. McMillan *v.* Freeborn County, 93 *Minnesota,* 16 (1904). Schumacher *v.* Wright County, 97 *Minnesota,* 74 (1906). As to remedy by appeal, see also State *v.* Johnson, 111 *Minnesota,* 255 (1910). The right of appeal is unaffected by a failure of the auditor to file the lien statement. State *v.* Johnson, 111 *Minnesota,* 10 (1910). (As to time when time to appeal begins to run see same case.) Not only is appeal to district court to be conducted in the same way as a trial de novo, but even the findings of the board are to be given no special or particular force or effect. Madsen *v.* Larson, 117 *Minnesota,* 369 (1912). Where appeal is tried in court of county other than one in which proceedings were instituted verdict of jury or order of court is final in that court and no judgment thereon is necessary. And right of appeal is limited to persons aggrieved or claiming damages, not necessarily including ditch petitioners merely because they petitioned. The assessment of viewers is prima facie correct and one appealing has burden of proof. State *v.* Nelson, 116 *Minnesota,* 424 (1912).

[42] *Laws,* 1905, ch. 230; amended by Laws, 1909, ch. 469, sec. 13. *Laws,* 1905, ch. 51. An order of the court on appeal from the assessment of damages in ditch proceedings under *Laws,* 1905, ch. 230, assessing the appellant's damages and directing judgment to be entered accordingly, is not a final appealable order within the terms of the statute. Prahl *v.* Brown County, 104 *Minnesota,* 227 (1908). No appeal lies from a judgment establishing a county ditch, since *Laws,* 1905, ch. 230, sec. 41, does not apply except to proceedings for assessing damages arising after construction of ditch. Aspelin *v.* Murray County, 115 *Minnesota,* 440 (1911). A judgment of the district court, upon appeal, affirming the order of commissioners in assessment proceedings, is not defective, because the lands affected are not described therein, if they are sufficiently described in other parts of the record. Dowlan *v.* Sibley County, 36 *Minnesota,* 430 (1887). See also Lindbergh *v.* Morrison County, 116 *Minnesota,* 504 (1912).

[43] Dressen *v.* Nicollet County, 76 *Minnesota,* 290, 291 (1899). Schumacher *v.* Wright County, 97 *Minnesota,* 74, 75 (1906). State *v.* Isanti County, 98 *Minnesota,* 89 (1906). Billsborrow *v.* Pierce, 101 *Minnesota,* 271 (1907). Heinz *v.* Buckham, 104 *Minnesota,* 389 (1908). State *v.* Posz, 106 *Minnesota,* 197 (1908). State *v.* Buckham, 108 *Minnesota,* 8 (1909). State *v.* Johnson, 111 *Minnesota,* 255 (1910). State *v.* Nelson, 116 *Minnesota,* 424 (1909). But a contractor is not required to resort to certiorari to review refusal of county board to approve final certificate of engineer, but may sue the county in direct action. Merz *v.* Wright County, 114 *Minnesota,* 448 (1911).

[44] State *v.* Posz, 106 *Minnesota,* 197 (1908).

[45] Dressen *v.* Nicollet County, 76 *Minnesota,* 290, 291 (1899). Billsborrow *v.* Pierce, 101 *Minnesota,* 271 (1907). Miller *v.* Jensen, 102 *Minnesota,* 391 (1907). Jurries *v.* Virgens, 104 *Minnesota,* 71 (1908). Johnson *v.* Morrison County, 107 *Minnesota,* 87 (1909). In Billsborrow *v.* Pierce, 101 *Minnesota,* 271 (1907), the court allowed injunction over objections that certiorari was the proper remedy, pointing out that the latter procedure does not permit an investigation into matters outside the record, may shut out interested parties, and is inadequate to protect against anticipated injury. See also Billsborrow *v.* Pierce, 112 *Minnesota,* 336 (1910). State *v.* Johnson, 111 *Minnesota,* 255 (1910). Kelling *v.* Edwards, 116 *Minnesota,* 484 (1912).

[46] Schumacher *v.* Wright County, 97 *Minnesota,* 74 (1906). Slingerland *v.* Conn, 113 *Minnesota,* 214 (1911). Johnson *v.* State, 111 *Minnesota,* 255, 261 (1910). Jacobson *v.* Lac qui Parle County, 119 *Minnesota,* 14 (1912). Temporary injunction held properly denied, and question raised as to

the statutory grounds, he has one means left to protect his rights, and that is to become delinquent in his payments of the assessments, whereupon, since these are collectible like ordinary taxes, an application will be made for a judgment against him for the amount of such delinquent taxes, and he may come in and oppose such application.[47] But in such a case he is confined to those defenses which are permitted under the statutes relating to applications for judgment for delinquent taxes in general (that is, that they have been partially or unfairly assessed, or have been paid, or that the property was not subject to taxation);[48] and he can not at that time avail himself of an insufficiency in the order establishing the ditch,[49] or a change in the starting point of the ditch, not authorized by the county board.[50]

Thus, it appears that the chief steps in the establishment of a public drain through the county commissioners are the petition, appointment of engineer and viewers after notice and hearing, reports of engineer and viewers, hearing thereon, order establishing the ditch, assessments of benefits and damages, letting of contracts, bond issues, approval of work done, and collection of assessments to pay off bonds.

Not only may a drainage ditch be established by procedure through the county commissioners and other county officials, but it may be secured through action by either the town supervisors, or the judge of the district court, or the state drainage commission.[51]

Town drainage ditches may be established on petition filed with the town clerk and signed by one or more persons or corporations owning lands that will probably be benefited, or by the chief executive of any city or village with streets likely to be improved thereby, or by town supervisors in similar cases. In such petition the town supervisors may be requested to appoint an engineer and an attorney. The town clerk gives notice of the hearing on the petition in much the same way as the auditor in county ditch proceedings, and then there is a meeting of the town supervisors, who may appoint the engineer and attorney. The whole body of supervisors, or a

whether landowner who appears in the proceedings and objects to them can thereafter enjoin them. Dahlberg *v.* Lundgren, 118 *Minnesota,* 219 (1912).

[47] State *v.* Johnson, 111 *Minnesota,* 255 (1910). Jacobson *v.* Lac qui Parle County, 119 *Minnesota,* 14 (1912).

[48] *Revised Laws,* 1905, sec. 919. (*General Statutes,* 1913, sec. 2108.)

[49] State *v.* Johnson, 111 *Minnesota,* 255 (1910).

[50] State *v.* Tuck, 112 *Minnesota,* 493 (1910). (With respect to irregularities in general, and appeals, injunctions, etc., it should be noted that no one can take advantage of any error, in proceedings or defects or irregularities in records, unless he is directly affected thereby. *Laws,* 1905, ch. 230, sec. 50; amended by *Laws,* 1907, ch. 367, sec. 5.)

[51] What might perhaps be called another method of establishing ditches is provided for through the county board or district court in cases where the petitioners are willing to pay all the expenses themselves, so that no obligation whatever is placed upon either the county or upon landowners not joining in such petition. This procedure as might be expected is more simple than the others provided by statute. See *Laws,* 1905, ch. 230, secs. 55-62.

committee composed of three of their number, then performs substantially the same duties as the three viewers used in the case of county drains, and the board as a whole acts as the county board does, and orders the establishment of the ditch. The remainder of the proceedings are, in general, the same as those followed in the opening of county drains, as to the letting of contracts, the giving of bonds, the form of the contract, modifications in plans, recording of lien statement, rules to be followed in the assessment of damages and of benefits, and certificates of completion. In these proceedings the town clerk and supervisors perform substantially the same functions, respectively, as the county auditor and county commissioners in county drain proceedings. The chief points of difference between the township drainage law and that for county ditching are as follows: (1) as might be expected, because of its lesser functions, the town law is much less detailed, and more simple than the county statutes; (2) the use of the procedure for the improvement of highways, and the consequent assessment of public corporations for benefits thereto seem to be slightly more emphasized in the township laws; (3) in the case of town ditches no bonds are issued to provide immediately available funds, but the ditch petitioners are required to advance all costs and expenses of the proceeding from its inception to its completion, including damages awarded and the cost of constructing the drain. Such advances are repaid pro rata when the moneys come in from the paying-off of liens and assessments for benefits.[52]

The action of the district court is invoked whenever it is desired to extend a ditch into more than one county. In such proceedings the judge of the district court and the clerk of that court, respectively, perform all the duties and have all the powers of the county board and county auditor, and are governed by many of the same statutory provisions. Thus, the judge appoints the engineer and viewers and holds the hearing, while the clerk of court posts and publishes the notices and receives the petition. The procedure throughout is practically the same as that followed in the establishment of county ditches. The distinguishing characteristics of the judicial ditch system which should be noticed are the following: (1) in case any proposed ditch extends into any other judicial district, proceedings may be commenced before the judge of either district, and such judge has jurisdiction of all subsequent matters relating to that ditch; (2) in the matter of financial administration, the judge by his order at the time of the hearings, or at any other time upon five days' notice of the time and place of such hearing given to the auditor of each county interested or affected, apportions the items and portions of expense to be borne by the respective counties, each one of which may then issue its bonds as in the case of a public drain in one county alone.[53]

[52] *Laws*, 1909, ch. 127.

[53] *Laws*, 1905, ch. 230; amended by *Laws*, 1909, ch. 469, *Laws*, 1911, ch. 384, *Laws*, 1907, ch. 367, *Laws*, 1913, ch. 179, 568, and 578.

The state drainage commission consists of the governor, the state auditor, and the secretary of state. It has power to construct ditches, widen, deepen, and straighten natural water-courses for drainage purposes, and open new outlets to lakes, if such lakes are normally so shallow as to be incapable of any beneficial public use of a substantial character for fishing, boating, or public water supply.[54] It makes surveys of wet lands and water-courses, and cleans and repairs state ditches, but as a condition precedent to the exercise of these latter powers it must require that persons or corporations benefited thereby shall pay for such benefits. The commission may, when necessary in order to carry out its duties, acquire private property by purchase or the exercise of the power of eminent domain.[55] Before the commission constructs any public drain it files a petition with the judge of the district court of the county in which it is proposed to construct the ditch, setting forth its necessity and containing a description and map of the route contemplated, land affected, and estimates of cost. Within ten days the judge of the district court appoints two residents of the county or counties concerned, who, together with one non-resident appointed by the state commission, perform functions similar to those of the viewers in county and judicial ditch proceedings, and report in detail within thirty days from the date of their first meeting. This report is filed with the clerk of the district court. Any persons aggrieved by the allowance of damages may petition the court for the appointment of appraisers in the same manner as in cases of appropriations of private property for public use, provided such petition is filed within ten days after the report of the viewers. After the filing of the viewers' report, there is a hearing before the court, due public notice having been given. At such hearing the assessments of benefits and damages, determined in a manner similar to that used in county and judicial ditch proceedings, are confirmed if satisfactory, and the construction of the

[54] *Laws*, 1907, ch. 470, sec. 1, 2. By sec. 34, *Laws*, 1905, ch. 106, relating to a state drainage commission, was repealed. If the lake be meandered it can be drained or lowered only on petition of at least sixty per cent of the legal voters who are freeholders with lands affected, and who reside within four miles of the lake. *Laws*, 1907, ch. 470, sec. 2. With reference to meandered lakes it may be noted that the drainage act of 1887 did not authorize the drainage of public meandered lakes. Witty *v.* Nicollet County, 76 *Minnesota*, 286 (1899). See also Dressen *v.* Nicollet County, 76 *Minnesota* 290 (1899). As to sufficiency of evidence to sustain finding of county board as to the character of a lake, under proceedings to drain it by authority of *Laws*, 1905, ch. 230, see Madsen *v.* Larson, 117 *Minnesota*, 369 (1912). It has been held that a statute making it a criminal offense for any person to drain a meandered body of water is not applicable to limit the effect of a later statute authorizing the draining of wet and overflowed lands through legal proceedings therein prescribed. (The drainage statute related to county drains and was *Laws*, 1883, ch. 108.) Dowlan *v.* Sibley County, 36 *Minnesota*, 430 (1887).

[55] *Laws*, 1907. ch. 470; amended by *Laws*, 1909, ch. 207, sec. 1. Special powers were given to the state drainage commission by the three following acts: *Laws*, 1911, ch. 138, "An act to authorize the state drainage commission to construct an outlet for the waters of the Mustinka state ditch in Traverse County, etc." *Laws*, 1911, ch. 370, "An act to authorize the state drainage commission to coöperate in the construction of an additional outlet for the waters of the Snake River in Marshall County, etc." *Laws*, 1909, ch 336, sec. 1, relating to Big Stone Lake, and the Minnesota and Whetstone rivers.

drain is ordered by the court. Jury trials, appeals, and the filing of lien statements are provided for in the usual manner. The state commission, however, furnishes the plans and specifications and lets the contract to the lowest responsible bidder, a bond being required, and the contract approved by the attorney general of the state. The county boards, in the counties concerned, issue the bonds of their respective counties, for amounts apportioned to them in assessments; and the liens, which are relied upon as the source of the moneys to be used in retiring the county bonds, must be paid off in twenty years, the first installment being due in not more than five years. The proceeds from the sale of county bonds are transferred by the respective county treasurers to the state treasurer, who credits them to the state drainage fund. The commission may appropriate out of its funds money in aid of ditch work not done by itself, provided such appropriation does not exceed one half of the total cost of the work.[56] The state drainage commission is authorized and directed to make a topographical survey of the watersheds of the state; prepare maps, plans, and specifications for their drainage for the use of counties concerned; prescribe rules governing ditches constructed in the various counties of the state; and coöperate with the United States Department of Agriculture in the making of surveys.[57]

It will already have been noticed that there are at least three great principles underlying all drainage procedure in Minnesota, whether the public ditch be established under the authority of town supervisors, or county commissioners, or judges of the district court, or of the state drainage commis-

[56] *Laws*, 1907, ch. 470; amended by *Laws*, 1913, ch. 4.

[57] *Laws*, 1909, ch. 471. The legislature of Minnesota has enacted a great number of statutes designed to adapt the general drainage laws to particular conditions or various contingencies arising in their administration, to remedy defects or irregularities in prior proceedings, to modify the statutes in the light of court decisions or protect rights which might otherwise be left unprotected as a result of proceedings in particular cases being held invalid in such decisions, and in general to make the laws more practicable. Given below is a list of the more important of such laws now in force.

Laws, 1905, ch. 230, as amended by *Laws*, 1907, ch. 367, sec. 9, and *Laws*, 1911, ch. 113, relating to assessments anew by county boards in cases where assessments already made have been declared invalid by the courts of the state.

Laws, 1905, ch. 230, as amended by *Laws*, 1909, ch. 469, sec. 13, authorizing purchase of right-of-way in adjoining states when necessary.

Laws, 1907, ch. 136, providing for changes in method of construction.

Laws, 1911, ch. 54, authorizing the consolidation of proceedings.

Laws, 1911, ch. 278, providing for readjustment necessary as result of formation of new county.

Laws, 1913, ch. 208, permitting reduction in estimating benefits to the extent of the value of land taken by the ditch and its waste bank from owner of land charged with benefits.

Laws, 1913, ch. 379, sec. 1, permitting addition to cost of ditch of cost of culverts omitted from estimates in engineer's report.

The following statutes which are curative are now in force: *Laws*, 1905, ch. 157; *Laws*, 1905, ch. 180; *Laws*, 1905, ch. 247; *Laws*, 1907, ch. 9; *Laws*, 1907, ch. 72; *Laws*, 1907, ch. 371; *Laws*, 1907, ch. 246; *Laws*, 1907, ch. 75; *Laws*, 1907, ch. 363; *Laws*, 1909, ch. 83; *Laws*, 1909, ch. 422; *Laws*, 1909, ch. 257; *Laws*, 1909, ch. 10; *Laws*, 1905, ch. 230 as amended by *Laws*, 1909, ch. 469, sec. 13; *Laws*, 191, ch. 384, sec. 14, as amended by *Laws*, 1913, ch. 335, sec. 1; *Laws*, 1911, ch. 292; *Laws*, 1911, ch. 273, sec. 1; *Laws*, 1913, ch. 2; *Laws*, 1913, ch. 463.

It has been held that a judgment restraining a county board from collecting a tax for benefits under irregular drainage proceedings did not prevent the board from instituting fresh proceedings under *Laws*, 1893, ch. 152, a curative act. Curran *v.* Sibley County, 56 *Minnesota*, 432 (1894).

sion. (1) All proceedings are commenced by petition, which, except in the case of state ditches, must be made by interested landowners. (2) The cost of the work and the damages allowed those whose property is taken or injured are paid by the landowners themselves in proportion to the benefits received by each of them. (3) All persons concerned are fully protected by requiring due notice of all important steps in the procedure, public hearings with an opportunity to protest against the establishment of the ditch, its plan and route, or damages assessed and awarded, jury trials, and the remedies of certiorari, injunction, and appeal.

CHAPTER VII

SWAMP LAND RECLAMATION IN MINNESOTA

Minnesota in her natural state had an area of more than 10,000,000 acres of swamp land, most of which was located in the northern counties of the state. St. Louis County contained 1,392,160 acres; Beltrami, 1,451,-520 acres; Koochiching, 1,000,000 acres; Lake, 798,600 acres; Itasca, 590,-600 acres; Roseau, 533,680 acres; Aitkin, 529,880 acres; Cass, 316,240 acres; Pine, 293,000 acres; Marshall, 258,240 acres; Clay, 230,000 acres; and there were over 100,000 acres each in the counties of Kittson, Otter Tail, Polk, Crow Wing, and Cook.[1] Although not recorded in surveys there were large amounts of swamp land in the southern counties of the state as well as in the northern.

While Minnesota was still a territory, the federal government had already adopted the policy of granting to the new states, on their admission into the Union, the swamp lands located within their borders. Two of the territorial governors urged the legislature to see to it that steps be taken to secure for Minnesota the wet areas within their boundaries;[2] but Congress took no action during territorial days.[3] By an act of March 12, 1860, the federal government conveyed to the state in fee, the whole of the swamp and overflowed lands, made unfit thereby for cultivation" within the state, provided "that the proceeds of said lands, whether from sale or by direct appropriation, in kind, shall be applied exclusively, as far as necessary, to the purpose of reclaiming said lands by means of the levees and drains aforesaid."[4] The commissioner of the general land office advised Governor Ramsey that he himself could decide whether to accept the plats and surveys of the federal government, or to order a resurvey under the direction of the state, and that he need not refer that question to the legislature.[5] But the governor did refer the matter to the legislature and asked them to decide

[1] Drainage Commission, *Report*, August, 1910, pp. 66, 67. (See Appendix 5, chart A.)

[2] Governor Gorman in his message of 1856, p. 9; Governor Medary, in his message of December 11, 1857, p. 34.

[3] In the session of 1855 of the territorial legislature a member gave notice of intent to memorialize Congress on the subject, but I find no such memorial.

[4] An act of September 28, 1850, entitled, "An act to enable the state of Arkansas to construct the necessary levees and drains to reclaim the swamp and overflowed land therein," by the act of March 12, 1860, was extended to Minnesota and Oregon. See also Minnesota, *Executive Documents*, 1860, at p. 5 of Governor Ramsey's special message.

[5] Letter of August, 8, 1860, to Governor Ramsey. Minnesota, *Executive Documents*, 1860.

the matter.[6] An act was passed establishing the bureau of public lands, composed of the governor, attorney general, and the superintendent of public instruction, and that body was to have charge of the swamp lands as well as other lands, and to cause a survey to be made of the wet lands embraced in the grant by Congress, such survey to be confined to twelve townships.[7] The object of this experimental survey was to test the correctness of the plats of the federal government, but the provisions of the statute were impracticable, and the survey was not completed. Largely for the purpose of avoiding the expenses that would be involved in a resurvey of the state, the bureau of public lands recommended the acceptance of the survey made by the general government,[8] which recommendation was carried out by the legislature. It then remained for the general land office to see to it that deeds covering the lands granted should be turned over to the state as fast as complete surveys in detail of such lands could be made. The grant of swamp lands thus having been duly accepted by the state, the question then arose as to the disposition of those lands, and the use that should be made of the funds derived from their sale if they should be sold.

It will be remembered that the grant of overflowed areas to the state contained a provision that the proceeds from the sale of such lands, or the lands themselves in case of direct appropriation, should be applied "exclusively, as far as necessary," to the drainage of these lands. It may be that this phrase, "as far as necessary" was construed to have the practical effect of sweeping away any conditions attached to the grant, and that for that reason the use of these lands for other than drainage purposes was urged from the time of the acceptance of the grant, but the fact seems to be that the condition of the conveyance to the state was simply ignored or forgotten for a great many years. For, from the very first, the leading public men of Minnesota advocated the use of these swamp lands for many purposes other than drainage. This was probably natural, because, as we have suggested, men in those early times were interested primarily in other things than drainage, and much better lands were still cheap and readily available for agricultural purposes. It will be remembered that the movement for state aid to drainage did not gain much headway until the Crookston convention of 1886.

The first objects to the support of which it was seriously urged that the state swamp lands should be devoted, were state institutions. Said Governor Ramsey, in his message to the legislature in 1861: "Upon the proceeds of the swamp lands we will have mainly to depend for the means of building up those great humane institutions, asylums for the blind, deaf and

[6] Governor Ramsey, in his message of January 26, 1861. *Executive Documents*, 1860, p. 5 of message.

[7] *Laws*, 1861, ch. 13.

[8] Governor Ramsey in his message of January 9, 1862, p. 14.

dumb, and insane, which are at once the glory and necessity of our modern civilization." He also suggested that some of such funds might be devoted to the erection of a new state prison, or to the endowment of normal schools, or distributed to the counties as a road fund.[9]

Notwithstanding this recommendation that state institutions be endowed by the moneys derived from the sale of the state's swamp lands, the legislature did nothing in that direction. But because of the great demand at that time for transportation facilities, the first of a series of acts was passed granting swamp lands in aid of railroad companies. An act of 1861 granted to the Lake Superior and Mississippi Railroad Company seven full sections of swamp lands for each mile of railroad constructed from St. Paul to Duluth.[10] In all, this grant included 694,000 acres of land.[11] Another act of the same year conveyed to the Taylors Falls and Lake Superior Railroad Company seven sections of the state's wet lands for every mile of line built from Taylors Falls to Wyoming, Minnesota.[12] Besides these two acts using the swamp lands for railroad purposes, all the state's wet lands situated in McLeod County were conveyed to the county commissioners in trust to be used in aid of the construction and maintenance of an agricultural college in that county.[13] At a later time, upon the location of the agricultural college elsewhere, it was enacted that these lands should be used for the endowment of Steven's Seminary.[14] About 4,683 acres accrued under this statute.[15] An act of 1862 provided for the construction of a state road from Madelia to a point on the western boundary of the state, named three persons as a commission to see to the carrying-on of the work, and appropriated 10,000 acres of swamp lands to furnish the necessary funds. The road was to extend towards Sioux Falls, South Dakota.[16] Later it was charged that this last grant was "very loosely guarded, and the gist of the whole scheme was to obtain valuable lands for a small consideration"; the patenting of the lands was delayed for a time; and the land finally conveyed amounted to but 4,683 acres.[17]

At the opening of the legislative session in 1863, Governor Ramsey again referred to the need of adopting a wise and far-seeing policy in regard to the disposition of the wet lands owned by the state. Because of the timeliness of the warning and of the fact that it incidentally throws some light

[9] Governor Ramsey in his message of January 9, 1861.
[10] *Laws*, 1861. Act of March 8.
[11] Auditor's Report of 1909-10, p. 22.
[12] *Laws*, 1861. Act of March 8.
[13] *Laws*, 1861, Act of March 12, ch. 65.
[14] *Special Laws*, 1868, ch. 114, p. 404. *General Laws*, 1865, ch. 7.
[15] Auditor's Report of 1909-10, p. 23. Other acts regarding McLeod affair are: *Special Laws*, 1870, ch. 92; *Special Laws*, 1879, ch. 70.
[16] *Special Laws*, 1862, ch. 56.
[17] *Special Laws*, 1866, ch. 111. Gov. Marshall in his message of Jan. 10, 1867, p. 16. Auditor's report for year ending Nov. 1866. *General Laws*, 1869, ch. 96, p. 118. Auditor's Report, 1872. *Executive Documents*, 1872, Vol. 1, p. 379; *Executive Documents*, 1873, Vol. 1, p. 507. Statistics.

on the expectations possessed by the Governor as to the value of these lands in the future it may be well to quote at some length from this message by Governor Ramsey. He wrote: "I can not but trust that the people and their representatives will continue to have an increasing appreciation of the value of these lands, and will steadily resist every application that may arise for their appropriation, unless for the most assured public necessity and benefit. Unless some new policy of this kind is inaugurated, these swamp lands, which I confidently anticipate will in a few years furnish us with a large reserve fund of millions of dollars to discharge whatever indebtedness the necessities or the follies of the state, in its earlier history, may have imposed upon us, as also for the erection and maintenance of those great eleemosynary institutions, which, before many years the state will be called upon to erect, at a cost of several hundred thousand dollars each, such as asylums for the insane, deaf, dumb, and blind, will have been wasted; and nothing but taxation, the great hindrance to immigration, will be left to us a resource for such purposes."

In spite of this vigorous message from Governor Ramsey the legislature of 1863 did nothing towards devoting the state swamp lands to the support of state institutions, but, on the contrary, passed an act granting to the St. Paul and Chicago Railroad Company, a predecessor of the Chicago, Milwaukee and St. Paul Railway Company, seven full sections of swamp lands for each mile of railroad constructed between St. Paul and Winona, a distance of about one hundred and three miles, such lands to be deeded to the company as each twenty-mile section of the line was completed.[18] This act, if the railroad complied with the conditions of the grant, would result in about 462,336 acres of swamp land passing out of the control of the state.[19]

Governor Miller, in his inaugural message of 1864, reaffirmed the position taken by Governor Ramsey, and gave a similar warning to the legislature against squandering the swamp lands or the proceeds from their sale. He said: "We are evidently drifting upon that alternative which shall secure the early appropriation of these lands," to the support of state institutions, or of "kindred objects or result in their inequitable distribution to corporations important to our prosperity, but secondary to the great interests involved. Along the track of legislation in the neighboring states, we everywhere discover the wreck of similar gratuities; and if, with these warnings, we pursue an equally reckless course, we shall deserve the condemnation both of our contemporaries and of the generations that will succeed us."[20]

[18] *Special Laws*, 1863, ch. 5, p. 149.

[19] About 425,300 acres were actually charged to the company, it having complied substantially with the terms of the grant. Auditor's Report of 1909-10, p. 23. For subsequent acts relating to this grant see: *Special Laws*, 1865, ch. 6. Also Gov. Swift's Message of Jan. 11, 1864, p. 6; Gov. Marshall's Message of Jan. 10, 1867, p. 16; Auditor's Report of 1873; and *Executive Documents*, 1877, Vol. 1, pp. 397 and 405.

Again in 1865 he urged the legislature to dedicate several hundred thousand acres of swamp land to the support of state institutions,[21] and this time his efforts and those of Governor Ramsey were successful. By an act of February 13, 1865 it was provided that as soon as the title to enough swamp lands was patented to the state by the federal government, the commissioners of the state land office should select and set apart for the erection and support of the following institutions the following amounts of swamp lands, the lands so selected to be irrevocably dedicated to those purposes: an insane asylum, 100,000 acres; deaf and dumb at Faribault, 100,000 acres; each normal school then or thereafter established, not exceeding three, 75,000 acres; state prison, 100,000 acres.[22] Another act passed later in the same session appropriated the remainder of any wet lands in the state to the erection and support of an orphan asylum for children of Minnesota officers and soldiers killed in the war.[23]

Though action regarding state institutions was thus secured in the session of 1865, the legislature had already passed two acts in further aid of railroads. One act granted to the Minneapolis and St. Cloud Railroad Company, now succeeded by the Great Northern, ten sections of swamp lands for every mile of line built from St. Cloud to Hinckley.[24] This amounted to 425,664 acres.[25] The second act granted to the same company four sections of similar lands per mile of railroad constructed from St. Cloud to any southern Minnesota railroad running from east to west, or to connect with the Winona and St. Peter Railroad Company's line.[26] Though the conditions of the former acts were complied with, those of the latter were not and that grant was subsequently declared forfeited to the state.[27]

And even after the act relating to aid for state institutions had been passed, the legislature went on to make further grants in aid of railroads, and of other private undertakings. A statute of February 16 appropriated four sections per mile to the Southern Minnesota Railroad, from Fillmore County to the western boundary of the state.[28] An act of March 2 gave to the Minnesota Central Railroad Company 275,000 acres for a line from Red Wing to Mankato by way of the Cannon River.[29] To aid the Cannon River

[20] Governor Miller in his message of Jan. 13, 1864.

[21] Governor Miller in his message of Jan. 4, 1865.

[22] *Laws*, 1865, ch. 5, February 13, 1865; for subsequent acts relating to this appropriation, see *Laws*, 1875, ch. 95; *Laws*, 1907, ch. 385.

[23] There does not appear to have been any action taken under this last act, and the auditor's report of 1909-10 records no selections as having been made under the act, which was ch. 3, of *Laws*, 1865, March 3.

[24] *Laws*, 1865. Act of February 11, 1865.

[25] *Auditor's Report*, of 1909-10, p. 23.

[26] *Special Laws*, 1865, ch. 3, p. 24.

[27] *Laws*, 1895, ch. 66. Other acts relating to this grant are: *Special Laws*, 1869, ch. 56, p. 249; *Special Laws*, 1881, ch. 65, p. 112; *Laws*, 1887, ch. 19, p. 76.

[28] *Special Laws*, 1865, ch. 1.

[29] Amended by *Special Laws*, 1873, ch. 110.

Improvement Company in the construction of slack-water navigation on the Cannon River it was given all swamp lands in the odd-numbered sections in the St. Peter land district, not to exceed 300,000 acres, and at the rate of four sections for each mile of navigation completed. Later these rights were transferred to others, for railroad and manufacturing purposes.[30]

In 1870 Governor Austin suggested that after the grants already made were satisfied, the swamp lands might be disposed of in the same manner as school lands, and the proceeds be devoted to the purchase of libraries for the public schools.[31] Nothing resulted from his proposition as to the use of the proceeds, but his suggestion as to the manner of sale may be noticed because it is an early forerunner of the constitutional amendment of 1881, and the present method of selling the state's swamp lands. Five years after this statement by Governor Austin a statute relating to the disposal of the state institutions' swamp lands provided that they should be "appraised and sold in the same manner and by the same officers, and the minimum price [should] shall be the same as provided by law for school lands under title one of chapter thirty-eight of the general statutes" with certain modifications. The principal of such funds should remain inviolate and invested in United States bonds or those of the state, and the interest annually apportioned to the support of the different institutions entitled to receive the same.[32] Six years after this method of sale had been applied to those swamp lands that were set apart for certain institutions, it was extended to all swamp lands owned by the state as a result of the following constitutional amendment: "All swamp lands now held by the state, or that may hereafter accrue to the state, shall be appraised and sold in the same manner and by the same officers, and the minimum price shall be the same less one third, as is provided by law for the appraisement and sale of the school lands under the provisions of title one of chapter thirty-eight of the general statutes. The principal of all funds derived from sales of swamp lands as aforesaid, shall be preserved inviolate and undiminished. One half of the proceeds of said principal shall be apportioned to the common school fund of the state; the remaining one half shall be appropriated to the educational and charitable institutions of the state, in the relative ratio of cost to support said institutions."[33] The statute referred to provides for public sale, and a minimum price of five dollars an acre. The similarity between the amendment and the law of 1875 is manifest. Thus it was that Governor Austin's suggestion as to the manner of sale, made eleven years before, and Governor Ramsey's, as to the use of the proceeds for the support of state

[30] *Special Laws*, 1865, ch. 76, p. 225; 1870, ch. 118, p. 438; 1873, ch. 110, p. 300; 1875, ch. 58, p. 290; 1877, ch. 244, p. 309; 1883, ch. 19, p. 196; 1885, ch. 101, p. 271.

[31] Governor Austin in his message of January 7, 1870, p. 17.

[32] *Laws*, 1875, ch. 95, p. 125.

[33] Proposed by *Laws*, 1881, ch. 48, March 3, 1881. Adopted November 8, 1881.

institutions, made twenty years before, were incorporated into the constitution of the state, after about 2,883,594 acres of swamp land had been granted in aid of private enterprises, chiefly railroads.

Here the suggestions leading up to the constitutional amendment of 1881 have been indicated. It will be necessary, however, to turn back for a moment and briefly mention two swamp land grants which went into effect before the adoption of the amendment. An act of 1875 granted to the Duluth and Iron Range Railroad Company ten sections for each mile of line built from Duluth to a certain township on the Mesabi Range, to be deeded in ten-mile tracts.[34] And an act of March 3, 1881 provided for the deeding of six sections per mile to the Sioux Falls and Dakota Railroad Company, a predecessor of the Northern Pacific, for a road from Little Falls to the western boundary of the state. This grant, if the required conditions were complied with by the railroad, would consist of 265,856 acres of swamp land.[35]

Thus, we have seen that by the adoption of the constitutional amendment in 1881 further appropriations of the state's swamp lands to the purpose of aiding in the construction of railroads were forbidden. The wet lands of the state were used to help railroads, state institutions, a slack-water navigation company, and a seminary, and now they were to be also used to add to the common school fund of the state. From the time of the acceptance by the legislature of the lands granted by Congress in 1860 no attention seems to have been given to the clause in the act by which the grant was made: "Provided, that the proceeds of said lands . . . shall be applied exclusively, as far as necessary, to the purpose of reclaiming said lands." The first public reference to this condition in the grant, which I have thus far been able to find, does not occur until nearly thirty years after the grant was made by Congress. In 1887 Governor Hubbard urged that the legislature take some action in aid of drainage, having been requested to do so by the Crookston drainage convention, which had met in 1886. Desiring to help the drainage movement, which had just begun to be strongly felt, he found that the constitution of the state stood in the way of direct appropriations to aid such ditches as were proposed in the Red River Valley, and then it was that he called people's attention to the condition in the grant of 1860, and pointed out that, if it had been considered, there might then have been available a large fund for the purpose of

[34] *Special Laws*, 1875, ch. 54. Other statutes regarding the same grant are: *Special Laws*, 1885, ch. 87; *Special Laws*, 1885, ch. 300; *Laws*, 1897, ch. 168.

[35] *Auditor's Report*, 1909-10. The state disputed the claims of the Northern Pacific, on the ground that 2.3 miles had not been completed at the western end of the last section of thirty miles of line built by it. The governor was authorized to compromise in 1901 by offering 35,456 acres, but no settlement was reached, and the state now denies the claims of the company. See *Laws*, 1901, ch. 193, p. 267.

drainage.[36] In 1895 Governor Nelson said: "The state, having accepted the lands, stands morally, if not technically, charged with the trust, and in expending money for this work of drainage, is doing no more than what it fairly undertook to do when it accepted the grant."[37] In the succeeding paragraphs of this chapter we shall see what the state has done to carry out the trust and to reclaim the swamp lands within her borders.

It has already been pointed out that there were originally in Minnesota over 10,000,000 acres of swamp lands, most of which was located in the northern counties of the state.[38] Fully ninety-five per cent of this entire area could be easily and cheaply drained, and about sixty per cent of it was either open marsh, meadow, or swamp sparsely timbered. The surface slopes were favorable to drainage works, since in some of the northern swamps there is a slope of as much as ten feet to the mile, and a declination of three and four feet to the mile is quite common.[39] The state does not have to face the problem of shutting out sea waters from low tidewater lands, nor is it necessary to build great levees along its watercourses. Drainage can be accomplished by digging the shortest possible canals to the nearest watercourses.

Although a drainage survey of the counties of the Red River Valley in 1886 had shown that outlets for the drainage of swamp lands in that region were not only feasible, but could be constructed at a cost which was very low compared to that in other parts of Minnesota or in many other states, very little work was done prior to 1895. In 1887 the first important drainage law was enacted, and the legislatures of 1893 and 1897 made appropriations amounting in all to $162,500; but these appropriations were small compared with the magnitude of the work to be done and to subsequent expenditures by the state, and it may be said that real progress in swamp land reclamation in Minnesota began about 1900.[40]

Because of the relatively greater importance to them of the swamp land problem, it would be expected that those counties that would accomplish the greatest amount of reclamation work in the state would be those of the Red River Valley and the northern part of the state; and such has been the case. Under the county and judicial laws Marshall County has drained 1,349,064 acres; Polk, 997,341 acres; Beltrami, 370,039 acres; Pennington, 284,945 acres; Clay, 284,717 acres; Kittson, 268,618 acres; Red Lake, 241,568 acres; Aitkin, 226,141 acres; Wilkin, 198,183 acres; Roseau, 168,470 acres; Norman, 164,463 acres; Koochiching, 127,749 acres; Redwood, 127,254 acres. The northern counties lead in the number of miles of ditches

[36] Governor Hubbard in his message of January 5, 1887 in *Executive Documents*, 1886-87, vol. 1:29.

[37] Governor Nelson in his message of January 9, 1895 in *Executive Documents*, 1894, vol. 1:27.

[38] Minnesota State Drainage Commission, *Report*, 1913, 16, 139.

[39] *Ibid.*, 16.

[40] G. A. Ralph in *St. Paul Pioneer Press*, January 21, 1912.

constructed by them as well as in the total cost of their work. Marshall County has built 920 miles of drain at a total cost of $1,496,702; Beltrami, 463 miles for $685,235; Pennington, 237 miles for $330,020; Clay, 186 miles for $328,224; Kittson, 159 miles for $296,290; Red Lake, 172 miles for $276,731; Aitkin, 280 miles for $470,620; Wilkin, 196 miles for $265,690; Roseau, 147 miles for $221,344; Norman, 134 miles for $172,053; Koochiching, 85 miles for $139,757; Redwood, 354 miles for $417,000.

The total number of acres of land drained or benefited by judicial and county ditches is 5,846,126. This work has involved the construction of 8,941 miles of public drains, and the excavation of nearly 80,000,000 cubic yards of earth, and cost $12,131,075. But the estimated benefits from the work are $20,844,223. The average price per yard paid contractors has varied from eight cents in Steele and Waseca counties and nine in Dodge and Faribault, to twenty-five in Koochiching, and twenty-two in Itasca;[41] and the average cost per acre of land benefited has run from $0.64, $0.81, $1.10 and $1.10 in Traverse, Polk, Norman, and Marshall counties, respectively, to $14.00, $14.80, and $16.00 in Jackson, Brown, and Lincoln counties.[42] In all county and judicial ditch work the average price per yard paid contractors has been 15.7 cents, and the average cost per acre for lands benefited, $2.07.

State ditches have been constructed under the authority of the Red River Valley Drainage Commission, and the present state drainage commission. During the years from 1893 to 1899 the Red River Valley Commission built nineteen state ditches at a total cost of $162,412, these drains being located in Grant, Traverse, Wilkin, Clay, Norman, Polk, Kittson, and Marshall counties.

The present commission, beginning its work in 1901, has built seventy-six more state ditches, and aided in the construction of nine coöperative drains. Over 1,157 miles of state and coöperative ditches have been completed, and over 16,000,000 cubic yards of earth excavated at a cost of $1,566,249. But this work has drained 336,641 acres of swamp lands, and benefits have been assessed against landowners amounting to $3,830,848. The work done since 1907 drains 292,037 acres of state lands and 681,105 acres of private lands.

The legislature of 1907 appropriated $200,000 for the use of the state commission, the legislature of 1909 an additional $200,000, and that of 1911 appropriated $50,000 for topographic and water resources surveys, $35,000 for the construction of an outlet for the Mustinka state ditch, $12,000 for assessments against state lands drained, and $5,000 to be used in coöperation with Marshall County in the construction of an additional

[41] See Appendix 5, Chart C.
[42] See Appendix 5, Chart D.

outlet for Snake River. The total sum appropriated for the use of the present commission since its creation is $502,000.[43] This fund, however, has been augmented by moneys paid in from time to time for assessments against private lands, by counties in which the state ditches have been located. The amount received from this source and credited to the drainage fund is $686,350. Thus, the commission has had at its disposal in the last six years $1,188,350. This fund has been appropriated as follows:

For drainage of state lands.....	$1,009,636
Coöperative ditches and surveys.....	63,540
Topographic surveys	39,629
Water resources surveys and investigations.	35,544
Outlet for Mustinka state ditch.....	35,000
Improvement for Snake River.....	5,000

On June 21, 1909 a coöperative agreement was entered into between the state drainage commission and the United States Geological Survey, under which a topographical survey supervised by state and federal engineers was made of a large area of land in Otter Tail, Douglas, Grant, Traverse, Stevens, Pope, Swift, and Crow Wing counties, and a report of the work published.

In May of 1909 a coöperative agreement was entered into between the Water Resources Branch of the United States Geological Survey, and the state commission, under the terms of which surveys and investigations of the water resources of the state were to be made, as directed by a resolution of the 1909 legislature.[44] The cost of the work was to be equally divided between the state and federal authorities. The results of these investigations were embodied in a special report. At the present time surveys have been made of all or parts of the following strems; and plans, estimates, and specifications for their improvement, so as to prevent disastrous overflows, have been prepared and furnished to the counties affected thereby. These rivers are the Minnesota, Mustinka, Watonwan, Embarrass, Cedar, Redwood, Stony Brook, Chippewa, Long Prairie and Wild Rice. A channel has also been surveyed through several lakes in Martin County, and a complete survey made of Mille Lacs Lake.

The work done by the state commission in the preparation of plans and the making of surveys indicates a growing realization on the part of the public authorities that the drainage problem is one that can be effectively

[43] The attorney general of the state in an opinion dated July 27, 1909, held that the appropriations of $25,000 to aid in the improvement of watercourses and drains, other than those benefiting state lands, and of $25,000 for the Whetstone River canal, were unconstitutional. On this point see also Constitution, art. 9, sec. 5.

[44] Joint Resolution Number 19.

solved, not with reference to arbitrary governmental divisions such as the county, but with regard to the topography of the land to be drained.

The state commission estimates that the cost of excavation has averaged about ninety per cent of the total expenditures for state ditches; culverts, bridges, road grades, and rights-of-way, three and one-half per cent; engineering and administrative expenses (including surveys, maps, plans, estimates, record books, office supplies, instruments, court costs, officers' fees, superintendence and inspection of work) six and one-half per cent. In the construction of nearly fifty state ditches under the assessment plan, where all expenses were charged against benefited lands, and many thousands of landowners assessed, there were no complaints of unjust taxation made to the commission. There was but one appeal from the court orders establishing the drains, and that was settled out of court. This fact, the low percentage of administrative costs and engineering costs, would indicate that the state drainage law is giving satisfaction, and is well adapted to accomplish the purposes for which it was enacted.

The policy of the state drainage commission has been to drain only such lands as would immediately become available for cultivation, because requiring little clearing or similar work before being fit for agricultural uses. Its work has, to a large extent, been confined to lands near to railroads and trade centers; it has avoided, so far as possible, the drainage of lands where the life of growing timber might be endangered by the removal of water from the soil.

In the construction of every ditch, public highways have been built along its sides from the excavated earth wherever such road construction was practicable. When drainage work now under way shall have been completed, there will be 575 miles of graded road along the several state ditches, constructed at but a small cost in addition to that of the ditches themselves. The average cost is not more than half a cent per cubic yard, or seventy-five dollars a mile of road.

Public drainage works already constructed under the county, judicial, and state-commission statutes have reclaimed approximately 7,179,767 of the 10,000,000 acres of swamp lands in Minnesota originally too wet for cultivation. This work has been done at a cost of $13,697,324, or about two dollars an acre. Although the assessed benefits amount to $24,675,071, and show a return of about two dollars for every dollar invested, yet the actual direct benefit to landowners has been estimated at from five dollars to eight dollars for every dollar expended in drainage. And of course the indirect benefits to the state caused by the increase in the value of the yearly crops of the state, betterment of public highways, and the promotion of health, are very great.

Perhaps a few concrete examples will serve to indicate the profitableness of public land drainage in Minnesota. At Island a four-thousand-acre farm

was reclaimed from the Floodwood swamp at a cost of two dollars an acre for drainage, and of from three to ten dollars for the clearing of timber, which was sold and considerably decreased the expense of reclamation. To-day the land is worth, exclusive of farm buildings, at least sixty dollars an acre. Land in the Gun Lake swamp in Aitkin County prior to the construction of state ditch number sixty-six was offered for sale at prices ranging from three and a half to five dollars an acre; but as soon as the construction of the ditch was begun, all state land sold as fast as it was placed on the market, and the price of farm land in that vicinity is now from sixteen to twenty-five dollars an acre. In 1912 the state auditor was selling reclaimed swamp land located at about seven miles from the county seat of Roseau County for as much as fifteen and thirty dollars an acre; formerly it was almost without any value whatever. And it is estimated that an investment of $30,600, in the drainage of 18,000 acres of state land by state ditch number sixty-nine will return to the state treasury approximately $450,000. For the cost of reclamation will be about one dollar and seventy cents an acre, and the land reclaimed will be sold at not less than twenty-five dollars an acre.

Because of the non-availability and incompleteness of the drainage records of the counties of Minnesota, it has been impossible to secure much information throwing light upon the question of the comparative efficiency of the state and county systems of reclamation. While the writer is of the opinion that any comparison would certainly not be to the disadvantage of the state drainage commission, and believes that it has done and is doing very efficient work and that its reports and figures are correct, the reader in drawing his own conclusions from the following figures should note that they are derived from the commission's own report. There have been some critics of that authority, but it is difficult to determine how much their adverse comments have been due to an unselfish interest in the welfare of the state, and how much to fear that the county system of land drainage may, as a result of comparison with state work, be shown to be less efficient than it ought to be. And in connection with the comparative cost of excavation work under the different authorities, it should be noted that the state commission may often secure better terms from contractors than the counties, since the contracts of the former are frequently much larger than those of the latter.

Average price paid contractors for one cubic yard of excavation:

In state and coöperative ditches	9.7 cents
In county and judicial ditches	15.7 cents

Average *cost* per acre of land benefited:

In state and coöperative ditches	$1.17
In county and judicial ditches	2.07

Average estimated *benefit* per acre of land benefited:	
In state and coöperative ditches	$2.87
In county and judicial ditches	3.56
Net profit per acre of land benefited:	
In state and coöperative ditches	$1.70
In county and judicial ditches	1.49[45]

[45] Except where special references are given in the footnotes, this chapter is based upon the 1910 and 1913 Reports of the Minnesota State Drainage Commission.

CHAPTER VIII

CONCLUSIONS

From the foregoing discussion of the progress that has been made in public swamp reclamation abroad and in the several states of the American Union, it is apparent that the United States has accomplished a considerable amount of drainage work during the comparatively few years which it has devoted to the problem of land drainage; and its experience, as well as that of other countries, conclusively demonstrates the practicability, wisdom, and profitableness of such undertakings. But it is also clear that there is still an enormous amount of land in this country which, in its present state, is too wet for cultivation; and that to render it suitable for tillage will necessitate the solution of many difficult engineering and administrative problems, and the expenditure of millions of dollars. Because of the almost total absence of available public records of the cost and expenditure of work done, and the general lack of interest in the subject, it has been difficult and indeed almost impossible to secure reliable or anywhere near complete information or statistics from which to make deductions as to the comparative efficiency of the different public agencies that have been employed in drainage work; yet some conclusions of interest or value may be drawn from the foregoing discussion.

In attempting to rank the American states with reference to the progress which they have made and are now making in land drainage, Ohio, Indiana, Iowa, and Illinois must be credited with having done the greatest amount of work in proportion to their original swamp-land areas. But while their laws as a whole are satisfactory, and they must be given the credit of doing pioneer work in wet-land reclamation, yet the absence of state-wide authorities has led to unnecessary expenditure which might have been avoided, especially in Illinois. At the present time, Michigan, Minnesota, and Missouri are probably doing the greatest amount of effective work; while Florida, Louisiana, and other southeastern states, containing more swamp lands than any others in the Union, have practically given away a large portion of their state lands and have only just begun to make them dry enough for cultivation. That Minnesota is taking a leading part in public land drainage in the United States is apparent from a consideration of the simplicity and practicability of its laws, the work of its state commission, its care in retaining the ownership of swamp lands, and the rapidity, excellence, and low cost of the work done by the state up to the present time.

If this study has revealed any general principle it is this, that to attempt to solve the problem of wet-land reclamation by agencies strictly confined to artificial territorial divisions, such as the county, or in larger problems, the state, is not only illogical but economically foolish. Statutory provisions for the coöperation of two or more counties in the same or in different states show that the truth has come to be recognized that successful drainage can not be accomplished without a consideration of the whole basin or watershed involved. The necessities are not essentially different from those of the sewerage system of a great city. No sensible person would think of building the upper end of the system without regard to the lower end, or of dividing the problem up into districts to conform to ward or precinct lines, and the construction of sewers in each district without regard to any other district, the sole object of each being to drain off its sewage on to some other land, without any consideration of possible effects upon surrounding territory. In planning the sewerage system of a municipality, if we are to be successful, we must at the very outset design each portion from outlet to the highest point, so that when the whole work is completed it will be a single unit composed of different parts working harmoniously together. And likewise in the drainage of swamp lands, whether the area to be reclaimed include ten acres or a million, it must, if included in a single river basin, eventually be drained as a unit. In England, individual holdings and districts were improved independently of each other, as though they had no common interests. As a continually larger part of the land was improved, the work of the several projects came in conflict more and more, and the work of earlier districts was made useless by later improvements. It has been estimated that as a result of this lack of regard for drainage basins as a whole, more than the present value of much of the fen lands of England has been spent in reclamation work, and the conditions, in some instances are still unsatisfactory. On the contrary, in Holland the very stupendousness of the problem was indirectly and to a certain extent an advantage to the people from a financial standpoint. For it was impossible for individuals to undertake the task of walling-out the waters of the sea, and, as a consequence, the interests of all the people and the topography of all the territory affected were considered in the solution of the problem; to that is to be attributed, to a considerable extent, the success of the Dutch. The fact that a given ditch for the time being gives some relief to a locality is no indication that it is properly laid out and constructed; it may become useless by the construction of another ditch above it, or, being badly planned, may increase the cost of drainage below. It is the realization of this truth that has been one of the causes leading to the creation of state drainage commissions in a few states other than Minnesota, that in this state led to the enactment in turn of laws relating to drainage by the successively larger agencies of township, county, and state, and, together with an increased ap-

preciation of the importance of wet-land reclamation in the United States has led to agitation for the participation of the federal government in the work of land drainage.

Up to the present time the national government has done nothing further in aid of swamp land reclamation than to make grants of land to the states; and, in view of the successful activity of persons interested in the irrigation of arid lands in the west in that direction, there has been surprisingly little agitation on the question of federal participation in drainage work. Congress has been memorialized on the subject,[1] and there have been several bills introduced therein relating to the drainage of overflowed lands through federal aid. In 1906 and 1908 Senator Flint, of California, tried to secure the passage of drainage acts similar to the irrigation laws of the United States, providing for the coöperation of states, corporations, or individuals with the secretary of the interior, and the creation of a fund to be loaned in assistance to public ditch projects.[2] A somewhat similar bill was introduced into the Senate in 1912 by John Sharp Williams; but none of these became laws.[3]

There has been some argument against federal participation in drainage work on the ground that the whole machinery with reference to the issuance of the necessary bonds and the collection and payment of interest and principal thereof should be state legislation resting upon the taxing power of the state, or upon the power of assessment for local improvement; that the national government has neither of these sovereign powers within the states; and that national irrigation statutes are to be distinguished from any that might be enacted relating to drainage in that in irrigation work the powers of the federal government have been exercised as a proprietor of arid lands, and not as sovereign, while in drainage work it would be unable to act in a proprietary capacity since it owns very little swamp land to-day.[4]

It is not necessary at this time to enter into a discussion as to the constitutionality of a federal law relating to drainage that would be similar in its provisions to national irrigation statutes the validity of which has been affirmed by the courts. Suffice it to say that there is eminent authority to the effect that such an act of Congress would be constitutional. And without reference to the question of constitutional law involved in the matter, it is certain that there are a great many arguments in favor of a participation by the national government in the work of land drainage thorough public action.

Practically all the reasons which have been advanced in favor of federal aid in irrigation work may also be given in support of similar aid to drainage

[1] 60-62 *Congressional Record*, 43: 1659. Oklahoma.

[2] 60-61 *Congressional Record*, 42 *Senate Report*, 289; *Scientific American*, 97:390.

[3] A. Ruhl in *Collier's*, 49:22.

[4] E. T. Perkins, Acting President of Second Annual National Drainage Congress in address at New Orleans, April 10-13, 1912.

projects. Not only is this work of reclamation of great importance to the health and prosperity of the United States as a whole, and immense sums of money beyond the ability of states or individuals to furnish needed to carry on operations until returns commence to come in from the sale of reclaimed lands, but the drainage problem offers better opportunities from a practical economic standpoint than does that of irrigation. The average cost of irrigation is thirty dollars an acre; that of drainage is about five or six dollars.[5] Swamp areas are more generally in the midst of more populous territory with already developed transportation facilities, the engineering problems as a rule are more simple, and the land is usually richer in itself than arid land. Then, too, the federal government is already well prepared to undertake such activities, for the United States Geological Survey, as the result of hydrographic and topographical surveys covering nearly a million square miles,[6] for several years has been gradually accumulating a great mass of maps, charts, statistics, and general information relating to rainfall, drainage, and watersheds.

But the principal argument in favor of a participation in drainage work by the national government is based upon necessity. The folly of attempting to solve this problem by means of agencies working independently of one another behind artificial governmental barriers has already been indicated, and has been given as one of the reasons for the development of state drainage commissions. It is also a reason for the control of drainage work by the federal government whenever very large areas are to be reclaimed. Without needlessly depriving any state of its prerogatives or sovereignty, or in the least undermining the principles of local self-government, and disregarding the fact that drainage work is often inextricably bound up with the problem of interstate waterways and irrigation, this important fact should be considered carefully, and given all the weight that it deserves: there are a considerable number of large swamps that lie in river basins extending through more than one state, and they can not be drained effectively or economically, or with justice to the inhabitants of each state, without the intervention of some interstate authority. The Dismal Swamp occupies parts of Virginia and North Carolina. The Savannah River on the northern border of Georgia, and the Appalachicola on its southwestern border have great swamp and overflowed areas in South Carolina, Alabama, and Georgia. Between North and South Carolina there are extensive interstate marshes. The Okefinokee swamps of Georgia must have their drainage outlets across the state of Florida. The Tombigbee Valley in Mississippi lies above the same valley in Alabama. The Pearl River bottoms

[5] United States Geological Survey estimates. 60 Congress, 1 session, *Senate Document 443;* G. E. Mitchell in *World Today*, 13:777.

[6] G. E. Mitchell, *World Today*, 13:777. (This was as early as 1907); Newell, W. D. Address at St. Paul, 1910.

occupy parts of Mississippi and Louisiana. The St. Francis Basin extends into both Missouri and Arkansas, while the swamp areas of the Red River of the North occupy Minnesota and North Dakota, and those of the Kankakee, both Indiana and Illinois. In short, the greater part of our swamp reclamation problems are interstate.

Not to speak again of the unnecessary waste of time, effort, and money that results from drainage by arbitrary territorial organs in disregard of topographical considerations, the injustice of such a lack of system upon landowners concerned may be illustrated by the situation in the St. Francis Basin. On the two sides of the Arkansas-Missouri boundary line, there are separate jurisdictions, different laws and processes, and engineers and drainage authorities working independently of each other. Missouri has already drained a large amount of land in the Basin, and the people of Arkansas are already taxing themselves to pay for the removal from their lands of this water. And as soon as Arkansas carries on reclamation work on any large scale, its landowners will have to spend a considerable part of their ditch-money in the proper disposal of the water which the people of Missouri have thrown upon them in draining the Missouri portions of the St. Francis Basin. It is clear that the logical manner in which to solve the problem of the Basin would be to drain it as a single unit, and assess the cost according to individual benefits in complete disregard of state lines or governmental divisions. It may be argued that in such a case the need of concerted action may be conceded, but that the remedy is to be found, not in action by the federal government, but in the coöperation of interested states in interstate drainage. Yet in the St. Francis Basin there is not the remotest possibility of joint action by Missouri and Arkansas; and up to the present time there has not been a single successful example of state coöperation in the reclamation of an interstate swamp. Some authority with jurisdiction greater than that of any state is needed, and the longer haphazard work is continued the greater will be the economic waste. The federal government is the only authority with powers broad enough or jurisdiction sufficiently extensive to bring about the reclamation of interstate swamps; it is prepared to do the work and its success in the irrigation of arid lands warrants the conviction that it would be a most efficient agent in the reclamation of swamps.

APPENDIX I

Drainage Statutes of States Other Than Minnesota

Arizona. Arizona Laws, 1 Session, 1912, ch. 38. (May 16, 1912.) Usual act, Election is held on question of establishing a drainage district; all real property owners in the district qualified as electors. The drainage commissioners are in two classes, and rotate in office with two year terms, being elected. Special election is held on question of bond issues. If bonds are insufficient, then an assessment may be levied after the election. Public purpose is required.

Arkansas. Kirby's Digest of Statutes, 1904, secs. 1414-1450. Act of April 23, 1903 (secs. 1414-1450, Kirby's Digest) was held constitutional in Beasley v. Gravette, 86 Arkansas. Amended and supplemented by Acts of 1907, acts 111, 432, 49; Acts of 1909, acts 181 and 279; Acts of 1907, act 314; Acts of 1911, acts 221, 54, 49, 136. Mandamus is authorized at various stages to compel action by the boards and commissions concerned in drainage work, and to expedite proceedings. This is a variation from general method adopted in most states to guard against delay, which is to prescribe a fixed time within which a given step in the procedure must be taken or completed. If bonds or interest coupons are unpaid thirty days after maturity, a court of chancery, on suit brought, may appoint a receiver to collect the taxes assessed. Public purpose or benefit is required.

California. Statutes, 1885, 204, ch. clviii, amended by Statutes, 1891, 262, ch. clxxxii. (Henning, General Laws, 1905, pp. 370-372.) Statutes, 1903, 354, ch. cclviii. (Henning, General Laws, 1905, pp. 414-417.) Very brief act, containing nothing unusual. There are various special laws for draining lands in particular counties such as Statutes 1865-66, 451; Statutes 1877-78, 1037; Statutes 1913, ch. 99. Especially important of these at the present time are, Statutes 1905, 443, ch. cccLxviii relating to the Sacramento Drainage District, and Statutes 1913, ch. 170, relating to Sacramento and San Joaquim Drainage District. By Statutes 1900, Extra Session Number 20, ch. xii, office of Commissioner of Public Works, appointed by governor for four years, was created, one of his duties being such examination and supervision of drainage works constructed under the laws of the state, as the governor might direct. In general, the California laws are so brief, and several steps in procedure so imperfectly treated, or not at all, that it is doubtful whether it can be cited to support the general text above as to drainage laws in general.

Colorado. Session Laws, 1911, ch. 124, expressly repealing Session Laws, 1909, ch. 161. Under certain conditions the county commissioners may dispense with an election; but must order one if so petitioned. In absence of election the county board itself supervises the work of construction; but if there is an election, three directors are chosen, who have charge of subsequent proceedings, such directors having fixed terms and rotating in office. Directors may issue bonds after an election on the question. Legality of establishment of the district cannot be called in question, if one year has elapsed without quo warranto proceedings having been instituted. Voluntary districts may also be organized. In general features and to some extent in phraseology the Colorado statutes are similar to those of Minnesota, though not quite so complete. Public purpose must be found.

Connecticut. General Statutes Revision of 1902, title 40, ch. 248. (Original acts are of 1861, 1862, 1864, and 1877.) secs. 4489-4499 and 4513. Act is very short. Authorizes formation of drainage companies on petition to superior court of county, which fixes bounds of the company, and appoints two "scavengers" who call first meeting of the company, which thereafter holds annual meetings for the election of clerk, treasurer, collector of taxes, and one scavenger, the last being general manager, and estimater of benefits. The company has power to open, repair, and enlarge

ditches, levy taxes, etc. (An act of 1862 provides for a similar organization through the justices of the peace.)

General Statutes Revision of 1902, title 40, ch. 249 (Original acts are 1711, 1750, 1821, 1732, 1846, 1673, 1728, 1702, 1864, 1853 and 1858) secs. 4500-4513. Amended by Public Acts of Conn. 1903, ch. 48. Work may also be carried on under two commissioners of sewers appointed by the superior court of any county on petition of landowners therein, viewers being appointed by the court and proceedings supervised by it. The Connecticut laws on drainage of marsh land are very brief and sketchy in character, not providing for bond issues, nor referring at all to the necessity of any public benefit appearing in either petition or findings.

DELAWARE. Laws of Delaware, volume 13, ch. 444 (Revised Code of 1852 as amended to 1893, ch. 59.) (The original act is of March 4, 1869.) Amended by volume 15, ch. 401; volume 16, ch. 90; volume 19, ch. 138; volume 21, ch. 257. (Volume 20, ch. 447, is no longer in force, having been repealed by volume 21, ch. 255.) Act is similar to that of Connecticut in simplicity of proceedings, and absence of any reference to a public purpose for the taking of lands of private persons. County commissioners have charge of proceedings until manager and treasurer are chosen by taxables at their first meeting, such officers being elected thereafter at annual meeting. Before work is commenced damages must first be paid to owners of lands taken or injured. At meetings of taxables each one has one vote for every dollar of taxes paid by him.

Laws of Delaware, volume 17, ch. 147 (Revised Code of 1852, as amended to 1893, page 570 et seq. in ch. 30.) Drainage corporations are authorized, and may enter on lands of private owners to do work and build ditches, after paying damages determined by commissioners appointed by the superior court. (The original act was passed March 14, 1883.) Laws of Delaware, 1901, ch. 167, sec. 71. (Same as volume 22, ch. 167.) Similar act relating to drainage corporations. Money for work done is raised by taxation of taxables "according to the nature of their property." (Amended by volume 22, Laws of Delaware, ch. 393; volume 23, ch. 154; volume 25, ch. 157.) And ch. 394 of volume 22, by ch. 156, of volume 25. Volume 13, ch. 444, is amended slightly by volume 24, ch. 154; volume 19, ch. 138; and volume 25, ch. 139. Volume 26, ch. 168, is amended by Laws 1913, ch. 160. The following acts relate to the incorporations of certain particular named drainage companies, and are therefore special in character, but still in force and effect, volume 19, ch. 659, and ch. 662; and chs. 660, 663, 665, 668. Volume 20, chs. 46, 47, 45, 48, 467-479. Volume 21, ch. 258. (Some of these acts amend special acts concerning named companies originally passed as early as January 22, 1831.) The following acts now in force relate to certain specified districts or counties in the state, and are therefore also special in character. Volume 19, chs. 661, 664, 669, 667. Another special act is Laws 1913, ch. 161. A house joint resolution entitled Laws 1913, ch. 310, named certain persons as commissioners to view the swamps of the state, and report to the next legislature as to method of draining these lands, estimated cost of such work, and the value of such lands when reclaimed.

FLORIDA. General Statutes of 1906, chs. 15 and 16, secs. 922-960, added to and amended by Laws 1905, ch. 5378; Laws 1911, ch. 6190; Laws 1913, ch. 6457. (Original act is Acts 1893, ch. 4178.) Petition to clerk of county by two or more landowners with bond. Proceedings under county commissioners. Anyone filing protest with bond for costs may cause the county board to appoint reviewers. Usual act otherwise; and very similar even in phraseology to Laws, Minnesota 1905, ch. 230, except more brief. Public purpose necessary.

General Statutes of 1906, ch. 16, secs. 950-960. (Original acts are Acts 1901, ch. 5035 and Acts 1903, ch. 5201, secs. 12 and 13.) On petition by majority of landowners "a public ditch" may be constructed in proceedings similar to those provided in ch. 15, but this act (ch. 16), does not prescribe that the work must be of public benefit; it may be merely for benefit of owners of private lands drained, unless application of statute is confined or limited by use of phrase "public ditch" in beginning of act as stated above.

Laws 1905, ch. 5377, creates a board of drainage commissioners composed of governor, comptroller, state treasurer, attorney general, and the state commissioner of agriculture, and authorizes the board to establish drainage systems, exercise the right of eminent domain, organize drainage districts, and levy acreage tax therein not exceeding ten cents per acre per annum to be collected by the county tax collectors. Amended by Laws 1907, ch. 5709, which itself specifies boundaries of a

single drainage district, and levies a tax of five cents per acre per annum on lands therein, the proceeds to be applied to their reclamation. (Apparently the commission now has no longer the power to itself establish drainage districts.)

Laws 1911, ch. 6297, is a special act creating a drainage district in Putnam county, and is similar to Laws 1905, ch. 5377, and to Laws 1907, ch. 5709, except that board of county commissioners and their successors are to be the controlling authority.

Laws 1913, ch. 6456. Establishes the Everglades Drainage District, levies a tax therein and places reclamation work therein under the board of commissioners of the Everglades Drainage District. This board is composed of the governor, comptroller, state treasurer, attorney general, and commissioner of agriculture, and it is given all the powers conferred by Laws 1905, ch. 5377, and Laws 1907, ch. 5709. (This act apparently supersedes prior act and is statute under which state work is being carried on at the present time.)

GEORGIA. Laws 1911, Number 265. Amended by Laws 1913, Number 169. Usual act except that the court to have jurisdiction of drainage matters in the county is composed of the clerk of the superior court, to whom the petition is first presented, and the board of commissioners of roads and revenues, or if there be no such board in the county, then the ordinary of the county. After the district is established then the landowners in the district elect three drainage commissioners who constitute a body corporate to carry on the work, condemn and acquire property, assess costs, and issue bonds of the district. (The act is fairly clear, but no marked similarity to the Minnesota statute.) A public benefit is necessary. This is the main act in Georgia.

Georgia Code of 1911, art. 12, secs. 432-439 and 5235. (Original acts are Acts 1878-1879, p. 171; Acts 1893, p. 112; Acts 1897, p. 34, and Acts 1898, p. 54.) Any county may establish ditches when "it shall judge the same to be proper." But evidently consent of owners of lands taken or injured is necessary, except in case of the "coast counties" which have the right of eminent domain and may proceed to take private property under the general statutes of the state regarding the exercise of that power. The procedure is the same as that for the establishment of public roads, that is, on application to the ordinary, the latter appoints three commissioners who must find road to be of public utility; the amount of damages to any individual owner may be referred to a jury of freeholders for determination. (The statutes relating to road procedure are Code of 1911, secs. 640-646; 678-689.)

IDAHO. Session Laws 1913, ch. 16. Usual statute. Petition is presented to clerk of the district court, which court appoints three drainage commissioners to have charge of the work, and continues to appoint them for three-year terms. Board of drainage commissioners may issue bonds without any election being required to give them authority for such issues. (Act is not similar to that of Minnesota in arrangement or phraseology; and it might be more clearly drawn.)

The statute of 1913 was passed as an emergency act, the reason given being that there "is no law on the subject now in force in the state." But Session Laws 1911, ch. 125 (a mere brief paragraph) had authorized the construction of drainage ditches across lands of non-consenting owners under the exercise of the power of eminent domain in proceedings already provided in relation to irrigation works. And Laws 1903, ch. 256, as amended by Laws 1907, ch. 98 (Idaho Revised Code 1908, Title 15), had provided procedure on petition to county commissioners, and the election of a board of drainage commissioners. (This act is very similar to the drainage statute of Washington, and apparently modeled upon the latter law. See Ballinger Annotated Washington Code. Title 27.)

ILLINOIS. Hurd's Revised Statutes of Illinois 1913, ch. 42 (Original act is Laws 1879, p. 120. The principal amending acts are Laws 1885, p. 109, and Laws 1913, p. 260. For references to the very large number of acts amending or supplementing the statute of 1879, see Hurd's Revised Statutes of Illinois 1913, ch. 42.) The petition is presented to the county court which appoints three commissioners to view the lands in the proposed drainage district, let contracts, and supervise the work. (See secs. 2, 5, 28 and 38 of ch. 42.) A jury is impanelled to determine benefits and damages to individual landowners. The usual proceedings by petition require the signature of a majority of the owners of land in the proposed district representing one third of the area of the land, or one third of the number of owners representing a majority of acres (See sec. 2, ch. 42), but it is provided that on petition of one fifth of the land owners a special election may be held to decide whether

or not the proposed district shall be organized. This election is conducted under the general election laws of the state. (See sec. 65, ch. 42.) A public purpose is necessary. Act is typical.

There is also provision in the statutes of Illinois for procedure in single townships under supervision of township officers, commissioners of highways, and justices of the peace (Laws 1885, p. 109. Revised Statutes 1913, sec. 75, et seq.); and an important act of special character is Laws 1913, p. 277, which relates to the Kaskaskia Island Sanitary and Levee District.

INDIANA. Burn's Annotated Indiana Statutes 1908, ch. 56, secs. 6140-6174. Amended and supplemented by Acts 1909, ch. 2; Acts 1909, ch. 173; Acts 1911, ch. 208; Acts 1911, ch. 288; Acts 1913, ch. 342. Drainage commissioner is appointed by the board of county commissioners in each county of the state, and is removable by it; the county surveyor is ex-officio the second drainage commissioner; the third is appointed by the court if it deems the initial petition sufficient. The petition is presented to the circuit or superior court. Drainage bonds may be issued only if the cost of the work exceeds $5,000. If land is wholly in one county, then the petition may be presented to the county commissioners, and procedure through them. Acts 1913, ch. 331, provides procedure for cases where a drain affects lands in an adjoining state. A public benefit is necessary. (See Burn's Annotated Statutes 1908, ch. 56, sec. 6143.)

IOWA. 19 General Assembly, ch. 44; 16 General Assembly, ch. 140; 18 General Assembly, ch. 85; 21 General Assembly, ch. 139; 17 General Assembly, ch. 121; 20 General Assembly, ch. 186; 22 General Assembly, ch. 97; 22 General Assembly, ch. 96; 20 General Assembly, ch. 188; 21 General Assembly, ch. 55; Code 1873, secs. 1207-1216, and sec. 1227. Code of 1897, Title x, ch. 2, secs. 1939-1966. Usual procedure through county board. If claims for damages are made then the auditor appoints the appraisers instead of the board of county commissioners. Bonds may be issued without any election. Before work is commenced the claims for damages must have been paid or secured by persons benefited by the ditch. In case landowner wishes to construct a drain across adjoining land, and cannot agree with its owner as to its construction, appeal may be had to township trustees who may establish the ditch after a hearing, but the petitioner must pay the damages awarded by the trustees and costs of the proceedings before commencing actual construction work.

19 General Assembly, ch. 44; 18 General Assembly, ch. 85; 16 General Assembly, ch. 140; 31 General Assembly, ch. 9; 21 General Assembly, ch. 139; 29 General Assembly, ch. 78; 30 General Assembly, ch. 67; 20 General Assembly, ch. 186; 31 General Assembly, ch. 82; 26 General Assembly, ch. 46; 31 General Assembly, ch. 83; 32 General Assembly, ch. 93; 30 General Assembly, ch. 68; 30 General Assembly, ch. 69; 30 General Assembly, ch. 70; 31 General Assembly, chs. 9, 85, 84, 86; 32 General Assembly, chs. 94 and 95. Code of Iowa Supplement of 1907, Title x, chs. 2 and 2A. (The code of 1897 and code supplement of 1907 have been amended by 32 General Assembly, chs. 93-95; 33 General Assembly, chs. 117-122; 34 General Assembly, chs. 85-89; 35 General Assembly, chs. 153-159.) Subdistricts may be created within drainage districts for more complete drainage of part of lands in the district on proceedings similar to those prescribed for the original establishment of a drainage district. Joint action of officials of more than one county is provided for in cases where the proposed ditch extends into more than one county. In case the officials of any county refuse to co-operate or act with others, then on petition the district court of any county concerned may order the ditch to be established.

In the statutes of Iowa a public purpose is a prerequisite to the establishment of a ditch. (See Code 1897, secs. 1939 and 1941.) The Iowa procedure is typical.

KANSAS. Laws 1911, ch. 168. Majority in interest of owners of land in any contiguous body of swamp may form a drainage district by signing articles of association obligating themselves to pay the cost of drainage works to be constructed, filing the articles in the office of the clerk of the district court of the county. Then summons is issued against non-consenting or non-signing landowners returnable at the next term of the district court of the county, at which time the court may summarily declare such drainage district a public corporation after hearing those who object to having their lands assessed for the work. Landowners then elect five supervisors, each acre having one vote. Annual elections are held thereafter. The supervisors have survey and plans made by an engineer, confirm assessments after hearing, supervise work, issue bonds, and let contracts. The procedure in other respects is the usual one. A public benefit must appear. (See General Statutes 1909, sec. 2987.)

Kansas Laws 1911, ch. 168, does not refer to any other or prior acts relating to drainage, but is a complete and separate statute on the subject. There are, however, other drainage laws still in force in the state, which are of the usual character. These provide for (1) township drainage; (2) proceedings through county commissioners with appeals to the probate courts; (3) instead of such county procedure for single ditches, the county board may establish or incorporate permanent drainage districts, the powers of such public corporations to be exercised by a board of five men elected by all the taxpayers in the district. (This board has usual powers as to supervision, and bond issues.) (4) proceedings through the district court in certain cases. General Statutes 1909, ch. 34, secs. 2968-3074. Amended by Laws 1913, ch. 184.

KENTUCKY. Acts 1912, ch. 132. Proceedings are under supervision of county judge, who orders establishment of drainage district if no exceptions are taken to the viewers' report. If exceptions are taken then a jury trial may be had on demand. After the drainage district is established and the report of the viewers confirmed by the court, the work is under the control of drainage commissioners appointed for four-year terms by the county judge, and reappointed by him as their terms expire. The damages allowed, "shall be considered separate and apart from any benefit the land would receive because of the proposed work." The act is the usual one except that it provides that on petition of one fourth or more of the total number of landowners affected by and owning fifty per cent or more of the total number of acres in a proposed district, the court must permit the district to be organized as a separate and distinct district under the control, not of the permanent drainage commissioners of the county (appointed by the court under the above statute) but of a board elected by the landowners. If the total assessment exceeds twenty-five cents per acre then the board of drainage commissioners may issue bonds for the amount of unpaid assessments, after publication, and any person neglecting to pay his assessment when due is deemed to consent to the issuing of such drainage bonds; and in consideration of the right to pay his assessments in installments he thereby waives his right to any defense against the collection of the assessments because of any illegality, irregularity, or defect in prior proceedings. (The act of 1912 repeals inconsistent acts, and therefore apparently repeals Kentucky Statutes 1903, secs. 2380-2412A.. Originally act of July 1, 1893, superseded or amended by acts of March 23, 1900; March 21, 1902; and March 27, 1902; as amended by act of March 21, 1906, i. e., Acts 1906, ch. 76, and by Acts 1906, ch. 150, and by Acts 1908, chs. 23 and 73.) But the act of 1912 expressly saves from repeal act of March 19, 1894 (Statutes 1903, secs. 2413-2417) and act of March 24, 1906 (Statutes 1903, sec. 2417A, or Acts 1906, ch. 151.)

Act of March 19, 1894 (Statutes 1903, secs. 2413-2417 and still in force by express exception from repealing clause of act of 1912) authorizes counties to drain swamp lands, and pay for such work out of the county levy derived from the taxation of all taxable property in the county, provided that such swamp lands cause sickness in the county.

Acts 1912, ch. 132, provides that viewers must report as to whether the work will be of public benefit, but there is no express duty on the court to so find.

Act of March 24, 1906, ch. 151 (Statutes 1903, sec. 2417A, and also still in force by virtue of exception from repealing section of Acts 1912, ch. 132) legalizes and continues corporations heretofore formed for drainage purposes under the laws of Kentucky.

LOUISIANA. Acts 1910, Act Number 317, amending Act 159 of 1902 and Act 135 of 1906. (The older statute regarding drainage is Act 37 of 1894 for which see Wolff's Constitution and Revised Laws of Louisiana 1904, secs. 1282-1284.) Acts 1906, Act Number 103. The statutes of Louisiana are less typical than those of most states, for example, Illinois, Indiana, Minnesota. No petition is provided for, and there is consequently no way for private owners to institute proceedings or compel the public authorities to act, but the police juries must take the initiative in organizing drainage districts. (See Act 317 of 1910, sec. 1.) Three of the five drainage commissioners who have charge of the work in each district are chosen by the police juries; the other two are appointed by the governor of the state. (See Act 317 of 1910, sec. 3.) The drainage commissioners may levy forced contributions or acreage taxes after petition by the owners of two thirds of the land in the district, or after an election participated in by all the property-owning taxpayers who have qualified as electors in the district. (See Act 256 of 1910, sec. 4.) The drainage

taxes are assessed against all property subject to state taxation in the drainage district, and not by special commissioners or drainage assessors, as is usually the case in drainage proceedings, but by the parish officials who make the assessments for state taxes. (See Act 317 of 1910, sec. 13.) The board of state engineers is required to make surveys and estimates as to the cost of proposed drainage works, lay off canals and levees, and "perform any and all other services in connection with the drainage and reclaiming of the lands of any district that may be required by the commissioners of said district." But the drainage district must pay all expenses incurred by the board in making surveys. (See Act 317 of 1910, sec. 21.) It is also the duty of the board to give special study to the drainage of swamp lands. (See Act 317 of 1910, sec. 25.) The power and duties of the state board of engineers, and of the governor, with respect to the appointment of some of the members of the drainage commissions, give the state government an opportunity to exercise some influence in the direction of better work and the planning of drainage projects with a view to the interests of the state at large.

Constitution of 1898, Art. 281, contains detailed provisions relating to drainage. It authorizes municipal corporations, parishes, and drainage districts to issue bonds for drainage works, thereby recognizing their right to construct drainage works as well as the existence of drainage districts, the latter nowhere else in the constitution being referred to. It has been held that the constitution contemplates that drainage districts should be separate entities, but that nevertheless the legislature might authorize police juries to establish drainage districts. See Mayor, etc. v. New Iberia, and Bayou, etc., District v. New Iberia 106 La. 651. (For amendment to Constitution 1898, Art. 281, proposed in 1906, see Act 122 of 1906.)

MAINE. Revised Statutes 1903, ch. 21, secs. 28-35. Statute one page in length providing for proceedings on petition through county commissioners, but damages assessed by the board after report from viewers must be paid by petitioners, and there is no provision for organization of a permanent drainage district or the issuance of bonds, or for appeals to the courts. Nothing whatever is required as to public character of the work, and evidently it is sufficient, so far as the statute is concerned, to justify the establishment of a ditch and the taking of lands therefor, merely to find that the work will be of benefit to the lands of the petitioners.

Revised Satutes 1903, ch. 26, secs. 42-70. Similar to ch. 21, secs. 28-35, except that procedure is by petition to supreme court of the county which appoints three commissioners to act as viewers, and have charge of the work, and appeals may be taken to the courts. Work is paid for out of moneys collected by a collector appointed by the drainage commissioners. After the ditch is constructed the proprietors may prescribe rules for its maintenance at meetings held for that purpose, each owner being entitled to vote in proportion to the number of acres owned by him.

It will be noted that these statutes of Maine are similar in their brevity, general provisions, and early enactment, to the drain laws of several other eastern states, such as Massachusetts, Delaware, Maryland (code of 1911), New Jersey, Pennsylvania, Rhode Island, Vermont and West Virginia. They are so different from such public drainage statutes as those of Illinois, and Minnesota, for example, that they do not support the discussion of drainage statutes in general as given in the text, and are merely given to show that the states in which they are in force, are not entirely without drainage legislation.

MARYLAND. Laws 1912, ch. 656. This is now the principal drainage act of the state, and is typical in every respect. There are the usual provisions for the appointment of a board of drainage commissioners, the issuing of bonds, and the organization of permanent drainage districts by means of procedure through the county commissioners. Although the statute in its title recites that it is to promote public health, convenience, and welfare, and the viewers are to report as to that matter, yet the county commissioners, in establishing the district have merely to find that the total benefits exceed the total costs. Sec. 27 appropriates $10,000 to constitute a drainage fund to be loaned, in sums not exceeding $2,000, for the expenses of any ditch project up to the time of the establishment of the drain.

Bagby's Annotated Code of Maryland, 1911, art. 25, secs. 36-87. (Original acts forming basis of code sections were passed as early as 1858.) Amended by Laws 1912, ch. 64. This is a brief statute similar to those of Maine and other eastern states, and not typical of drainage statutes discussed in the text. (See paragraphs on Maine statutes supra.) Procedure is under control of county commissioners until

the taxables, voting in proportion to the amount of taxes paid by each of them, choose a board of managers and treasurer who then supervise the work. The treasurer may by ordinary civil action compel payment by those defaulting in meeting their assessments. There is no provision for bond issues, and nothing as to the necessity of any benefit to the public. (Some counties are expressly exempted from the provisions of the statutes. For an example, relating to Somerset county, see Laws 1912, ch. 802.)

MASSACHUSETTS. Revised Laws 1902, ch. 195, secs, 1-16. (Original acts are Acts of 1702, ch. 11; 1795, ch. 62; 1745-1746, ch. 16; 1885, ch. 384.) Very brief statutes providing procedure through the superior court of the county which need merely find that the ditch will be "for the general advantage of the proprietors." Commissioners are appointed by the court, and assessments collected by a collector without bond issue or the organization of any permanent drainage district. This statute is of the same kind as those of Maryland and other eastern states referred to in discussion of laws of Maine and Maryland supra.

Revised Laws 1902, ch. 195, secs. 17-25. (Original acts are Acts 1855, ch. 104, and Acts 1857, ch. 292.) This is similar to Revised Laws 1902, ch. 195, secs. 1-16, except that procedure is through the county commissioners instead of through the court.

Acts 1913, ch. 759. This authorizes the state board of agriculture and the state board of health, acting as a joint board, with the approval of the governor and council to take wet lands (except salt marshes) under the power of eminent domain, and reclaim them by prison labor, use two years' crops for state institutions, and then sell the lands to form a "wet lands reclamation fund"; $15,000 is appropriated for the work. (See also Acts 1913, ch. 633.)

MICHIGAN. Howell's Annotated Statutes 1912, Title XII, ch. 45, secs, 3366-3477. (Original acts were passed as early as 1857, and are very numerous.) Amended by Public Acts of 1913, Number 249. These statutes are typical. Each county has an official known as a drain commissioner. He is elected for a term of two years, and he lets the contracts and has general supervision of the drainage work. There is provision for the appointment of a special drain commissioner in cases where the regularly elected one is interested in the proceedings. The petition must be approved, and the necessity of the drain and its public character determined, by the township board. In case the drain commissioners of adjoining counties cannot agree as to matters connected with the construction of a ditch extending through more than one county, they may appeal to the highway commissioner of the state for a settlement of their differences.

MINNESOTA. (See chapter on drainage procedure in Minnesota.)

MISSISSIPPI. Laws 1906, ch. 132. Evidently same as Mississippi Code of 1906, secs. 1682-1727. The code sections are amended by Laws 1908, ch. 173; and by Laws 1910, chs. 188-191. This act, which apparently is not very carefully drawn, authorizes proceedings through the chancery court of the county, and contains the usual provisions, and in addition provides particularly for compensation by upper districts to lower ones. Ten named counties are excepted from the provisions of the statute. There is no reference in the act to any necessity of the public purpose of the work appearing.

Laws 1902, ch. 70. (Code of 1906, secs. 371-391.) Procedure through county supervisors is provided, the viewers being named in the petition, but the supervisors themselves having control of the work throughout the proceedings and the construction of the ditch. Land may be taken under the general laws of the state relating to the exercise of the power of eminent domain.

Laws 1908, ch. 141, expressly provides that drainage bonds shall be exempt from state taxation. And Laws 1908, ch. 147, creates the Tallahatchie Drainage District and incorporates its commission which is appointed by the governor for four-year terms, and authorized and empowered to drain the swamp lands of the district.

MISSOURI. Revised Statutes 1909, ch. 41, secs. 5496-5661. Amended by Laws 1911, Acts of March 30, 1911, p. 205; April 12, 1911, p. 222; April 12, 1911, p. 223; April 12, 1911, p. 225; and by Laws 1913, Acts of March 24, 1913, p. 233; March, 27, 1913, p. 267; March 25, 1913, p. 281. (See the last act especially.) These acts are of the usual character, and provide procedure through circuit courts, or county courts. Drainage works may also be constructed by action under the supervision of the latter courts without the organization of any permanent drainage district. (The Missouri laws are very complete, and are, as a rule, well draughted.)

MONTANA. Laws 1905, ch. 106. Amended by Laws 1909, ch. 144. Usual act. One drain commissioner is appointed by the board of county commissioners for a two-year term. He receives the petition and examines the lands without the aid of either viewers or engineers, and lays out the ditch. If releases cannot be secured from owners of land to be used for the ditch, the district court, after hearing and on application by the drain commissioner, appoints three commissioners to assess damages (but *not* benefits). On filing of their return the fee in land necessary for the drain vests in the county in trust for drainage purposes only, provided no appeal is taken. The county drain commissioner then establishes the drainage district and lets the contracts, and then assesses benefits himself; appeals to the district court may be had from his decision as to benefits. The statute is also slightly different from the usual drainage laws in that it contains an express prohibition of any restraint by injunction of assessment collection, unless the amount of the assessment is first paid into the county treasury as security. In case the drain extends through several counties, and condemnation of private land is necessary, the district court of any county on application of the regular drain commissioners, appoints three special drain commissioners to act together in the matter. The statutes do not provide for bond issues. To justify the establishment of a drain it may be beneficial to the public health *or* conducive to the improvement of lands, but probably a public purpose is regarded necessary.

NEBRASKA. Laws 1881, p. 236; Laws 1911, p. 453; Laws 1909, p. 504; Laws 1891, p. 360; Laws 1905, p. 608; Laws 1877, p. 160; Laws 1911, p. 466; Laws 1905, p. 616; Laws 1905, p. 529; Laws 1905, p. 632; Laws 1907, p. 474; Laws 1909, p. 511; Laws 1909, p. 531; Laws 1911, p. 485. Drainage is authorized by (1) county authorities; (2) incorporated companies; (3) individual landowners; (4) districts organized by the district courts of the state; (5) districts organized by vote of the landowners.

The county board act is very brief with usual steps, except that the board itself acts as viewers, and determines damages; and failure to make application in writing to the board for damages, before the hearing, shuts off any claim for damages. If more than one county is concerned, action is by joint action of the county boards. Public purpose is necessary.

Drainage may be by individual owners under the supervision of the county board with the customary appraisers, but no bond issues. The work in such cases may be for the public welfare, *or* sanitary or agricultural purposes. (As to public character of work see Jenal v. Green Island Drain Company, 12 Neb. 163.)

Evidently the principal act is that relating to the establishment of ditches by means of procedure in the district court, instituted by the filing of signed articles of association. The work is controlled by an elected board of supervisors. Here, as in the case of county ditches, a ditch must be for a public purpose or of public benefit.

NEVADA. Statutes of 1913, ch. 281. Usual proceedings in general features are provided. Petition is presented to the county board which appoints a board of three commissioners for three-year terms to have charge of the work. A special election is required to authorize the issue of bonds. The board of county commissioners, as a condition precedent to the appointment of commissioners, and the latter, as condition precedent to the establishment of the ditch and the making of assessments, need not necessarily find that the work will be of public benefit. It may be sufficient that the benefits to landowners exceed the costs of the drain construction.

Revised Laws 1912, sec. 5606, sub-secs. 3 and 5, states that among the public uses for which the power of eminent domain may be exercised, is that of draining and reclaiming lands. Except for this brief statutory provision there was no drainage legislation of a general character until the act of 1913.

NEW JERSEY. Compiled Statutes 1910, pp. 3241-3261. (Original acts were passed before 1878 revision, and amended since then.) These statutes relate to the drainage of tidewater lands, as distinguished from swamp or meadow grassland, the statutes relating to which are treated in the following paragraphs. Public purpose is unnecessary. Application is made to the court of common pleas to appoint commissioners to assess damages and lay out banks. Then the owners elect men to see to the construction and maintenance of the works. This procedure, and acts providing it, are similar to the statutes of such eastern states as Maine, Massachusetts, and Delaware, already referred to. Corporations may also be organized for the draining or protection and reclamation of tidewater lands.

Compiled Statutes 1910, pp. 3261-3271. (Original acts prior to 1878.) These provide simple procedure without bond issues through highway surveyors and chosen freeholders. Act is not typical. (Managers of geological survey are authorized to examine lands, make surveys, and adopt drainage system, reporting to the supreme court which appoints three commissioners to execute the work, with power to make assessments and issue bonds. Public Laws 1871, p. 25, as amended by Public Laws 1877, p. 662; Public Laws 1894, p. 268; Public Laws 1877, p. 71; Public Laws 1886, p. 342; Public Laws 1888, p. 208; Public Laws, 1906, p. 378. See Compiled Statutes 1910, pp. 3276-3284.)

Public Laws 1890, p. 495, as amended by Public Laws 1903, p. 702, and by Public Laws 1904, p. 239. This is a brief township drainage act.

Drainage is also authorized by the county authorities solely for benefits to public health (See Public Laws 1881, p. 265; Public Laws 1881, p. 195, as amended by Public Laws 1885, p. 279; by Public Laws 1886, p. 41; Public Laws 1887, p. 50; Public Laws 1888, p. 465; Public Laws 1889, p. 141; 1892, p. 47, and 1898, p. 373); and through the court of common pleas. (See Public Laws 1903, p. 131, as amended by the following public acts: 1908, p. 280; 1906, p. 303; 1907, p. 674; 1908, p. 285; 1910, p. 188; 1910, p. 191.) For further acts in New Jersey see Laws 1911, pp. 128 and 155; Laws 1913, pp. 162, 192, 632, 670.

In general the statutes of New Jersey do not expressly require any finding that a given work will be of public benefit or utility, except that certain acts provide for reclamation for sole purpose of improving the public health. (See paragraphs above.)

New Mexico. Laws 1912, ch. 84. The procedure is through the district court only. The statute is clearly drawn, and contains the usual provisions, except that one of the grounds of objection which may be urged at the first hearing, in addition to the usual ones such as the insufficiency of the petition, is "the constitutionality of the law." There is no mention of the necessity of public benefit from the ditch; the court need merely find that it will promote agricultural interests. And at the first hearing the court is confined solely to legal questions such as the sufficiency of the petition, and cannot exercise its discretion as to the possibility of the costs exceeding the benefits from the work, but must appoint viewers if the proceedings thus far are legally valid. To this extent, and with reference to the provision relating to "the constitutionality of the law," the New Mexico statute is very similar to Laws Wyoming 1911, ch. 95, and probably based upon it.

New York. Laws of 1909, ch. 20. Amended by Laws 1910, ch. 624. Usual statutes. The procedure is through either local courts on petition of the owners of a majority in acres of the land to be drained, or, through a representative of the conservation commission acting on the advice of the state engineer. In the latter case the initial petition need not be signed by more than one person.

North Carolina. Laws of 1909, ch. 442. Laws of 1911, ch. 67. The drainage laws of the state contain nothing unusual, except that the petition is filed with the clerk of the superior court of the county who may himself order the establishment of a ditch. He keeps a drainage record. Appeals may be carried to the supreme court of the state. After the drainage district has been established three drainage commissioners are appointed by the superior court of the county. One of the viewers must be an engineer. Bondholders may compel the levy of assessments by mandamus on six months' default in the payment of either principal or interest.

North Dakota. Laws 1895, ch. 51. Amended by Laws 1903, ch. 80; Laws 1899, ch. 79; Laws 1901, ch. 39; and by laws 1907, chs. 93 and 94; and by Laws 1911, chs. 124 and 125. The procedure is through the county commissioners, and the ditch must be found to be of public benefit. The laws are rather brief, and contain no unusual feature.

Ohio. Page and Adam's Annotated Ohio General Code 1910, secs. 6442-6535. Amended by Laws 1913, p. 185. This is a typical public drainage statute similar to those of Illinois and Minnesota. Jury trials may be had on demand. Proceedings under the county commissioners' supervision by this statute.

Page and Adam's Annotated Ohio General Code 1910, secs. 6536-6563 (48). Amended by Laws 1911, pp. 313-314, and pp. 575-585; and by Laws 1913, p. 185. This statute provides for joint action of the boards of county commissioners in cases where a ditch extends through more than one county. It contains no peculiar provisions.

Page and Adam's Annotated Ohio General Code 1910, secs. 6564-6595. By this

act similar proceedings are provided for in cases where a ditch may extend into a county in an adjoining state and be of benefit to lands therein.

All of the general drain laws of Ohio require a finding that the ditch will be of public benefit as a condition precedent to its establishment.

OKLAHOMA. Revised Laws 1910, ch. 27. (Original act is Act of August 24, 1908.) Amended by Laws 1911, ch. 132, and by Laws 1913, ch. 115; and Laws 1913, ch. 166. This act contains the usual provisions for procedure through the county commissioners and for joint action of county boards in cases where the drain extends into more than one county. To justify the taking of private property and the establishment of the drain, it is sufficient that the ditch may be of public benefit "or of agricultural interests."

OREGON. Lord's Oregon Laws 1910, secs. 6126-6146, and 6163-6166. (Original acts are Laws 1889, p. 25; Laws 1891, p. 47; Laws 1909, chs. 177, 44, and 133.) Amended by Laws 1911, chs. 142, 241, and 250. These statutes provide for the customary procedure through the county court on petition of twenty-five of the owners of lands "susceptible of one system of drainage," such petition giving the names of three persons willing to serve as trustees for one year. Petitioners make by-laws signed by a majority of persons owning land in the district, and providing a method for appointing subsequent trustees to carry on the work. The drainage district may bring an ordinary civil action to condemn lands. The statutes do not expressly require any finding that the ditch will be of public benefit or utility. As to eminent domain for drainage purposes in Oregon see Laws 1909, ch. 216, p. 342, amended by Laws 1911, ch. 238.

Lord's Oregon Laws 1910, secs. 5791-5799. (Original act is Laws 1868, p. 21. Amended by Laws 1905, ch. 149.) Amended by Laws 1913, ch. 52. Simple procedure through the county court for building a single ditch, without permanent organization or bond issues, without necessity of public benefit appearing, and with damages paid before work commenced.

Lord's Oregon Laws 1910, secs. 6147-6162. (Original acts are Laws of 1895, p. 117; 1909, ch. 146; 1905, ch. 199; 1907, ch. 146.) Usual proceedings through county court, but adapted to the drainage and protection of tidewater lands by diking districts.

Lord's Oregon Laws 1910, secs. 5800-5812. (Original act is Laws 1880, p. 53. Amended by Laws 1882, p. 56.) Relates to the organization of a drainage district in Washington county, and is therefore special in character.

Laws 1911, ch. 172, authorizes the formation of drainage corporations with the power of eminent domain.

Laws 1913, ch. 11, authorizes the state land board to contract for the drainage of lakes and swamps, and the sale of such lands to the reclaiming contractors. (Evidently similar to policy adopted by Florida for a time. See chapter on work in states other than Minnesota.)

PENNSYLVANIA. Act of April 4, 1863. (See Purdon's Digest, pp. 289-290, vol. 1.) Very brief act providing for petition to the court of quarter sessions, and the payment of damages by petitioners before constructing works, a public purpose not being expressly required, and no permanent organization provided.

Acts of April 5, 1870; May 9, 1871; June 15 ,1871; and May 19, 1871. (See Purdon's Digest, pp. 290-292, vol. 1.) Similar act not requiring public purpose, but not authorizing the assessment of any benefits against non-consenting landowners. Both statutes are like those in other eastern states such as Massachusetts, Maine, New Jersey, Delaware. Maryland.

RHODE ISLAND. Laws 1896, ch. 76. Statute similar to that of Pennsylvania, briefly providing for proceedings through township authorities, with costs paid by petitioner, and public purpose ignored.

SOUTH CAROLINA. Laws 1911, 27 Statutes, S. C., p. 92. This is the usual act and is similar to that of North Carolina. It provides that the clerk of the court of common pleas of the county perform the functions usual to board of county commissioners or county judge. He appoints a board of drainage commissioners to supervise the work, and issue bonds, etc. About seven counties are expressly excepted from the provisions of the statute. A public purpose is necessary. This is the principal statute now in force in the state.

Acts S. C. 1912, Number 411. This is a very brief act authorizing procedure through county commissioners who appoint the drainage commissioners who act as viewers and also supervise the work. But some steps are left out; no bonds are

authorized, and although the petition may state that the ditch is for the promotion "of public health, *or* to advance agricultural interests," no finding as to public benefits is necessary.

There are many special acts relating to particular counties, such as Code 1912, vol. 1, sec. 2196, et seq., but they have been held unconstitutional. See State v. Hammond, 66 S. C. 300. (As to these see also Code 1912, secs. 2239-2265.)

Laws 1907, 25 Statutes, S. C., p. 524. Governor, on petition of the majority of representatives to the state legislature from any county, may appoint with their approval a sanitary and drainage commission for that county, to have charge of public drains already built, and to make surveys. (As to drainage laws of South Carolina, see also Acts 1912, pp. 92, 101, 113, 107, 715, 731, and Acts 1913, pp. 65 and 69.)

SOUTH DAKOTA. Laws 1907, ch. 134; Laws 1909, chs. 69, 127, 102; Laws 1911, chs. 129, 130, 131. See also Compiled Laws of South Dakota 1909, vol. 1, ch. 25. Usual procedure through county commissioners, but state engineer receives copies of the petitions, and has some powers as to examination, recommendation, and supervision.

TENNESSEE. Public Acts 1909, ch. 185. Amended by Public Acts 1913, chs. 25 and 37. Usual act with authority vested in the county court. Public purpose necessary.

TEXAS. Acts 1895, p. 151. Amended by Acts 1897, p. 95, and Acts 1899, p. 242; Acts 1889, p. 95; Acts 1905, p. 212; Acts 1907, p. 78; Acts 1909, p. 24. See Revised Civil Statutes of Texas 1911, title 47. Typical acts with action through commissioner's court of the county. And Revised Civil Statutes 1911, secs. 1261-1267, authorized the formation of drainage corporations. These acts being indefinite and uncertain, however, are evidently superseded by General Laws 1911, ch. 118, and General Laws 1913, ch. 36, but the procedure in general is the same. General Laws 1913, ch. 28, provides a means of winding up the affairs of districts organized under the old statutes. In Texas a public benefit must be found to authorize the work.

UTAH. Compiled Laws 1907, title 20. Brief act containing nothing unusual. County commissioners may organize a district without finding it of public utility, and then landowners elect the trustees to carry on the work, issue bonds, etc.

VERMONT. Public Statutes 1906, ch. 182. Not a statute supporting the text discussion, but similar to those of Maine, Massachusetts, New Jersey, Delaware, Pennsylvania, and Rhode Island.

VIRGINIA. Acts 1906, ch. 188. Acts 1910, ch. 312, amended by Acts 1912, ch. 159. Similar to law of North Carolina, except that procedure is through the county circuit court itself instead of its clerk. A public benefit is made necessary by the act. No unusual provisions requiring comment.

WASHINGTON. Laws 1895, p. 271. Amended by Laws 1905, p. 360; 1909, extra session, p. 47; 1909, p. 563; 1901, p. 181; 1907, pp. 101, 376, 219, 669; 1903, p. 42; 1909, p. 690; see Remington and Ballinger's Annotated Code, secs. 4137-4181. Amended by Laws 1913, chs. 42 and 86. Proceedings under control of county commissioners who order an election to determine question of establishing drainage district, and to choose drainage commissioners, if they find that the proposed work will be of public benefit. If additional works are desired, the drainage district petitions the superior court of the county, which must find them a public benefit.

Laws 1895, p. 304. Amended by Laws 1905, p. 171; 1899, p. 187; 1901, p. 226; 1907, p. 175; 1909, p. 630. See Remington and Ballinger's Annotated Code, secs. 4091-4136. Amended by Laws 1913, ch. 89. These are similar statutes relating to diking districts for the tidewater counties.

Laws 1909, p. 789. See Remington and Ballinger's Annotated Code, secs. 4182-4214. Ditches and dikes in more than one county may be constructed by joint motion of county commissioners, notice being given to them by the commissioner of public lands of the state.

Laws 1913, ch. 60. Creates a state department of agriculture, and by sec. 12, one of its duties is to make surveys of lands affected by drainage projects and a classification of them.

Laws 1895, p. 142, and amendments thereof, provides for payment of expenses of work already done under Laws 1890, which was declared unconstitutional in Askam v. King County, 9 Wash. 1, and in Skagit County v. Stiles, 10 Wash. 388, as permitting the taking of private property for a private purpose, and superseded by Laws 1895, p. 271, which requires a public benefit to appear. As a result of similar adverse decisions, Remington and Ballinger's Annotated Code, secs. 4215-4267, as amended by Laws 1911, ch. 97, is superseded by Laws 1913, ch. 176.

WEST VIRGINIA. Code Virginia 1860, ch. 124. See Code of West Virginia 1906, secs. 3189, 3191. Merely two brief paragraphs not requiring public purpose, providing no permanent organization; requiring expenses to be paid by petitioners, and therefor similar to acts of other eastern states such as Maine.

WISCONSIN. Statutes 1913, secs. 1379 (11), to 1379 (31e). (Original act is Laws 1891, ch. 401. Frequent amendments.) The chief act. A permanent drainage district may be formed by petition to the circuit court. A public purpose is necessary. Nothing unusual, except that the petition must contain a report from the college of agriculture as to soil, probable costs and benefits, etc.; and there is provision for a determination of the constitutionality of the law by the circuit court at the first hearing. This, however, differs from the New Mexico statute, in that in this case the judge must not only find the law valid, but must also find the work of public benefit. This is similar to the Wyoming statute as to constitutionality.

Statutes 1913, secs. 1372-1379. (Original act since often amended is Acts 1862, ch. 398.) Typical county board act.

Statutes 1913, secs. 1359-1367. (Original is Acts 1862, ch. 398.) Brief law relating to town drains, and containing nothing unusual.

In Wisconsin a public purpose is necessary. (Statutes 1913, sec. 1379 [14].)

(Prof. E. R. Jones of the University of Wisconsin, in a letter to writer, April 17, 1912, points out that the chief objection to the drainage district law is that it is rather cumbersome in its initial steps, so that legal costs are very large, and average 20 per cent of the entire expense of the drain, in one case being 40 per cent.)

WYOMING. Laws 1911, ch. 95. Usual act through the district court, which, however, must appoint commissioners if it finds that petition and notice are sufficient, that it has secured jurisdiction, and that the law is constitutional. In this last respect the law is like that of New Mexico (Laws 1912, ch. 84), but differs from it and is similar to that of Wisconsin in that a public benefit must appear to the court in Wyoming.

SUMMARY. States without general drainage statutes are two: Alabama and New Hampshire.

States with brief, older, and more private laws are ten: Connecticut, Delaware, Maine, Maryland (Code of 1911), Massachusetts, New Jersey, Pennsylvania, Rhode Island, Vermont, and West Virginia.

The other states have statutes in general of the type set forth in the text. Thirty-six.

Although in some states because of the statutes reading in the alternative as to the necessity of a specific finding that a given ditch will be of public benefit (e. g., that court shall find that drain will be of public benefit, *or* increase the value of agricultural lands), the question is somewhat in doubt, yet it is probably safe to say that all the drainage laws require such a benefit to appear, except the following thirteen, which are the same as the ten eastern states named above and New Mexico, Utah, and Mississippi (Laws 1906, ch. 132.) (Of course some of the New Jersey Laws are solely for public health purposes.)

APPENDIX II

Drainage Laws of Minnesota

GENERAL ACTS

General Laws, 1858, ch. 73
General Laws, 1866, ch. 27
General Laws, 1867, ch. 40
General Laws, 1874, ch. 57
General Laws, 1877 ch. 55
General Laws, 1877, ch. 91
General Laws, 1878, ch. 39
General Laws, 1879, ch 38.
General Laws, 1883, chs. 108, 139
General Laws, 1885, chs. 25, 51, 69, 71.
General Laws, 1887, chs, 97, 98, 99
General Laws, 1889, ch. 168
Laws, 1893, chs. 152, 221
Laws, 1895, chs. 81, 164, 82, 84, 95, 96, 293, 378, 403, 83
Laws, 1897, chs. 105, 180, 328, 103, 318, 142, 155
Laws, 1899, chs. 274, 323, 347
Laws, 1901, chs. 76, 90, 258, 381
Laws, 1902, chs, 38, 39
Laws, 1903, chs. 178, 311, 315, 285, 386, 188, 217
Laws, 1905, chs. 230, 106, 157, 145, 247, 180, 311
Laws, 1907, chs. 19, 371, 366, 191, 75, 330, 448, 470, 367, 138, 246, 363, 72, 9
Laws, 1909, chs. 377, 469, 127, 207, 336, 375, 471, 422, 257, 44, 83, 10, 191, 118, 119
Laws, 1911, chs. 113, 384, 370, 278, 138, 54, 272, 273
Laws, 1913, chs. 2, 4, 463, 22, 145, 179, 208, 235, 335, 528, 379, 567, 568, 578

SPECIAL ACTS

Most of these authorize the drainage of lands therein described or the lowering of certain lakes for drainage purposes, while some make small appropriations to aid in the drainage of certain property specified in the statute.

Special Laws, 1875, chs. 152, 157, 159
Special Laws, 1876, chs. 190, 192, 193, 194, 195
Special Laws, 1877, chs. 127, 246
Special Laws, 1879, ch. 187
Special Laws, 1883, chs. 257, 267, 268, 309
Special Laws, 1885, chs. 69 (at page 231), 192, 193, 216
Special Laws, 1887, chs. 222, 241, 357
Special Laws, 1889, chs. 358, 389, 320, 127, 540, 300, 124, 557, 98
General Laws, 1891, chs. 60, 162 (at page 319), 408, 482
Laws, 1893, ch. 241 (at page 396)
Laws, 1895, ch. 403 (at page 807)
Laws, 1897, chs. 103 (at pages 171, 176, 139, 187), 155

APPENDIX III

Drainage Cases in the Minnesota Supreme Court

Anderson *v.* Meeker County.....46 Minnesota, 237
Billsborrow *v.* Pierce.....101 Minnesota, 271
Billsborrow *v.* Pierce.....112 Minnesota, 336
Bowler *v.* Renville County.....105 Minnesota, 26
Clay County *v.* Olson.....123 Minnesota, 437
Cunningham *v.* Big Stone County.....122 Minnesota, 392
Curran *v.* Sibley County.....47 Minnesota, 313
Dalberg *v.* Lundgren.....118 Minnesota, 219
Dodge *v.* Martin County.....119 Minnesota, 392
Dresser *v.* Nicollet County.....76 Minnesota, 290
Fairmont Cement Stone Manufacturing Company *v.* Davidson.....122 Minnesota, 504
Gaare *v.* Clay County.....90 Minnesota, 530
Geib *v.* Morrison County.....119 Minnesota, 261
Gourd *v.* Morrison County.....118 Minnesota, 294
Heinz *v.* Buckham.....104 Minnesota, 389
Jacobson *v.* Lac qui Parle County.....119 Minnesota, 14
Johnson *v.* Morrison County.....107 Minnesota, 87
Jurries *v.* Virgens.....104 Minnesota, 71
Kelling *v.* Edwards.....116 Minnesota, 484
Kipp *v.* Dawson.....31 Minnesota, 373
Lager *v.* Sibley County.....100 Minnesota, 85
Lien *v.* Norman County.....80 Minnesota, 59
Lindbergh *v.* Morrison County.....116 Minnesota, 504
Lyon County *v.* Lien.....105 Minnesota, 55
McMullen *v.* Freeborn County.....93 Minnesota, 16
Madsen *v.* Larson.....117 Minnesota, 369
Meeker County *v.* Schultz.....110 Minnesota, 405
Meiz *v.* Wright County.....114 Minnesota, 448
Miller *v.* Jensen.....102 Minnesota, 391
Minnesota Canal and Power Company *v.* Koochiching County.....97 Minnesota, 429
Moody *v.* Brasie.....104 Minnesota, 463
Mulgrew Boyce Company *v.* Freeborn County.....112 Minnesota, 5
Prahl *v.* Brown County.....104 Minnesota, 227
Rasmussen *v.* Town of Hutchinson.....111 Minnesota, 457
Schumacher *v.* Wright County.....97 Minnesota, 74
Slingerland *v.* Conn.....113 Minnesota, 214
State *v.* Johnson.....111 Minnesota, 255
State *v.* Lindberg.....120 Minnesota, 147
State *v.* Lindig.....96 Minnesota, 419
State *v.* McGuire.....109 Minnesota, 88
State *v.* McGuire.....114 Minnesota, 281
State *v.* Tuck.....112 Minnesota, 493
State ex rel. Arpin *v.* George.....123 Minnesota, 59
State ex rel. Hadler *v.* District Court.....114 Minnesota, 424
State ex rel. Haney *v.* Clark.....112 Minnesota, 516
State ex rel. Hassing *v.* Quinn.....108 Minnesota, 528
State ex rel. Johnson *v.* Crosby.....92 Minnesota, 176
State ex rel. Kenny *v.* Nelson.....116 Minnesota, 424
State ex rel. Pederson *v.* Watts.....116 Minnesota, 326
State ex rel. Ross *v.* Posz.....106 Minnesota, 197
State ex rel. Schafer *v.* Buckham.....108 Minnesota, 8
State ex rel. Schubert *v.* Town of Rockford.....102 Minnesota, 442

State ex rel. Utick *v.* Polk County.....87 Minnesota, 325
State ex rel. Wait *v.* Baxter.....104 Minnesota, 364
State ex rel. Wickstrom *v.* Isanti County.....98 Minnesota, 89
Town of Martinsburg *v.* Butler.....112 Minnesota, 1
Van Pelt *v.* Bertilrud.....117 Minnesota, 50
Wheeler *v.* Almond.....110 Minnesota, 503
Witty *v.* Nicollet County.....76 Minnesota, 286
Ziemke *v.* Hohenstien.....111 Minnesota, 542

APPENDIX IV

Drainage Work in Minnesota

TABLE A

Original Area of Swamp, Wet, and Overflowed Lands in Minnesota Counties

County	Acres	County	Acres
Aitkin	529,880	Mahnomen	50,000
Anoka	50,000	Marshall	258,240
Becker	50,000	Martin	45,180
Beltrami	1,451,520	Meeker	27,120
Brown	77,480	Mille Lacs	34,000
Carlton	70,000	Morrison	20,000
Cass	316,240	Mower	20,000
Chippewa	20,900	Murray	55,296
Chisago	15,000	Nobles	12,000
Clearwater	72,000	Norman	50,000
Clay	230,000	Otter Tail	162,000
Cook	102,159	Pine	293,000
Cottonwood	19,000	Polk	174,000
Crow Wing	127,000	Red Lake	202,175
Dakota	12,300	Redwood	120,000
Faribault	28,000	Renville	120,000
Fillmore	23,000	Roseau	533,680
Freeborn	154,000	St. Louis	1,392,160
Grant	33,000	Sibley	36,300
Hubbard	77,000	Stearns	40,000
Isanti	20,000	Steele	16,000
Itasca	590,600	Stevens	44,960
Kanabec	42,000	Swift	57,000
Kandiyohi	80,120	Todd	45,000
Kittson	184,000	Traverse	42,000
Koochiching	1,000,000	Wadena	80,000
Lac qui Parle	51,000	Waseca	27,016
Lake	798,600	Washington	15,360
Le Sueur	12,000	Wilkin	50,000
Lincoln	12,000	Yellow Medicine	51,000
Lyon	18,000		

[1] These estimates are contained in 1913 report of state drainage commission, and were prepared from personal surveys and examinations, official records, estimates of county officials and other sources. The following counties, because of the small amount of swamp lands within their borders or the absence of any, have been omitted from the table:

County	Acres	County	Acres
Benton	10,000	Pope	3,500
Bigstone	3,100	Ramsey	.....
Blue Earth	4,000	Rice	5,300
Carver	2,200	Rock	900
Dodge	1,000	Scott	860
Douglas	7,974	Sherburne	10,000
Goodhue	4,400	Wabasha	10,240
Hennepin	.....	Watonwan	6,000
Houston	2,200	Winona	9,600
Jackson	4,000	Wright	3,000
McLeod	9,000	Area of Minnesota	53,943,379
Nicollet	5,500	Land surface	50,355,379
Olmsted	.....	Lake surface	3,943,379
Pipestone	.....	Swamp land area	10,112,720

TABLE B

Area Drained by County and Judicial Ditches

Counties are listed in order as to amounts drained. Estimates are from 1913 report of State Commission

County	No. of Acres	County	No. of Acres
1. Marshall	1,349,064	38. Crow Wing	15,307
2. Polk	997,341	39. Murray	14,000
3. Beltrami	370,039	40. Dodge	13,853
4. Pennington	284,945	41. Faribault	12,337
5. Clay	284,717	42. Meeker	12,310
6. Kittson	268,618	43. Waseca	12,295
7. Red Lake	241,568	44. Big Stone	12.098
8. Aitkin	226,141	45. Isanti	11,094
9. Wilkin	198,193	46. Sherburne	11,081
10. Roseau	168,470	47. Blue Earth	10,659
11. Norman	164,463	48. Hennepin	10,419
12. Koochiching	127,749	49. Cass	10,000
13. Redwood	127,254	50. Steele	9,091
14. Traverse	89,090	51. Stevens	8,933
15. Anoka	58,041	52. Wright	7,848
16. Grant	53,621	53. McLeod	7,842
17. Otter Tail	49,000	54. Kanabec	7,471
18. Renville	48,618	55. Lyon	7,295
19. Pope	46,516	56. Lincoln	7,072
20. Kandiyohi	44,462	57. Wabasha	6,704
21, Todd	31,947	58. Mille Lacs	6,553
22. Yellow Medicine	31,276	59. Nobles	6,500
23. Freeborn	29,545	60. Washington	6,076
24. Wadena	28,383	61. Pine	4,886
25. Nicollet	24,216	62. Itasca	4,700
26. Martin	23,827	63. Carlton	4,666
27. Chippewa	23,247	64. Benton	4,196
28. Clearwater	23,219	65. Watonwan	4,062
29. Lac qui Parle	20,823	66. Becker	3,569
30. Le Sueur	20,000	67. Dakota	3,381
31, Stearns	19,861	68. Rice	2,727
32, Swift	19,420	69. Carver	2,403
33. Chisago	19,281	70. Hubbard	2,179
34. Brown	18,572	71. Cottonwood	2,088
35. Sibley	16,838	72. Ramsey	2,019
36. Jackson	15,515	73. Winona	1,487
37. Douglas	15,360	74. Scott	671
37. Douglas	15,360		

TABLE C

Average Price Per Yard Paid Contractors in Minnesota Counties

These figures are based upon the 1913 report of the State Drainage Commission

County	Cents	County	Cents
Aitkin	10.31	Blue Earth	17.23
Anoka	14.25	Brown	12.53
Becker	12.00	Carlton	15.55
Beltrami	14.00	Carver	11.20
Benton	15.10	Cass	11.00
Big Stone	16.71	Chippewa	11.00

County	Cents	County	Cents
Chisago	15.36	Nobles	12.00
Clay	12.90	Norman	14.00
Clearwater	15.98	Otter Tail	14.00
Cottonwood	16.00	Pennington	12.66
Crow Wing	15.00	Pine	14.00
Dakota	12.59	Polk	13.18
Dodge	9.00	Pope	11.70
Douglas	12.40	Ramsey	17.00
Faribault	9.00	Red Lake	10.50
Freeborn	9.07	Redwood	9.60
Grant	10.34	Renville	11.00
Hennepin	19.87	Rice	12.00
Hubbard	12.76	Roseau	13.63
Isanti	11.91	Scott	12.00
Itasca	22.00	Sherburne	13.00
Jackson	11.00	Sibley	10.00*
Kanabec	16.20	Stearns	15.00
Kandiyohi	10.05	Steele	8.00
Kittson	12.60	Stevens	12.64
Koochiching	25.00	Swift	11.00
Lac qui Parle	13.50	Todd	15.00
Le Sueur	15.00	Traverse	9.50
Lincoln	14.00	Wabasha	10.50
Lyon	16.00	Wadena	12.30
McLeod	10.00	Waseca	8.00
Marshall	11.70	Washington	10.40
Martin	12.00	Watonwan	12.00
Meeker	17.00	Wilkin	13.00
Mille Lacs	15.50	Winona	12.00
Murray	12.00	Wright	14.00
Nicollet	11.00	Yellow Medicine	14.50

In considering this table as well as others relating to the cost of work done, it should be remembered that in some counties the engineering work is much more simple than in others, the land with such a slope as to be easier drained than in some other counties, or the projects larger, and therefore contractors lower in their prices on account of the size of the jobs let.

TABLE D

Average Drainage Cost Per Acre of Land Benefited by County and Judicial Drains

The counties in the following list are arranged according to the cost of work done, beginning with the lowest. The figures are taken from the 1913 report of State Drainage Commission

1.	Traverse	$0.64	13.	Grant	1.45
2.	Polk	.81	14.	Beltrami	1.85
3.	Koochiching	1.09	15.	Hubbard	2.00
4.	Marshall	1.10	16.	Aitkin	2.08
5.	Norman	1.10	17.	Wabasha	2.20
6.	Pennington	1.15	18.	Cass	2.50
7.	Red Lake	1.17	19.	Watonwan	2.60
8.	Kittson	1.20	20.	Pine	2.60
9.	Clay	1.25	21.	Anoka	2.65
10.	Itasca	1.26	22.	Carlton	2.89
11.	Roseau	1.31	23.	Winona	3.00
12.	Wilkin	1.40	24.	Yellow Medicine	3.00

*Report of state drainage commission for 1913, upon which this chart is based, gives Sibley county at .10c. This is evidently a clerical error.

25.	Becker	3.00
26.	Kanabec	3.00
27.	Pope	3.00
28.	Redwood	3.25
29.	Wadena	3.30
30.	Swift	3.31
31.	Todd	3.80
32.	Otter Tail	3.80
33.	Chisago	3.87
34.	Crow Wing	3.90
35.	Dodge	4.00
36.	Washington	4.10
37.	Sherburne	4.90
38.	Mille Lacs	5.00
39.	Nicollet	5.60
40.	Isanti	5.68
41.	Murray	5.70
42.	Douglas	5.90
43.	Renville	6.40
44.	Steele	6.40
45.	Rice	6.45
46.	Clearwater	6.67
47.	Sibley	6.75
48.	Waseca	6.80
49.	Dakota	6.80
50.	Blue Earth	6.84
51.	Stearns	7.40
52.	Benton	7.50
53.	Meeker	7.52
54.	Stevens	7.98
55.	Kandiyohi	8.25
56.	Wright	8.78
57.	Nobles	9.50
58.	Faribault	9.83
59.	Freeborn	9.86
60.	Big Stone	9.91
61.	Lyon	10.00
62.	Scott	10.00
63.	Hennepin	10.51
64.	Chippewa	10.86
65.	Le Sueur	11.00
66.	Carver	11.00
67.	McLeod	11.00
68.	Ramsey	12.00
69.	Martin	13.00
70.	Lac qui Parle	13.75
71.	Jackson	14.00
72.	Brown	14.80
73.	Cottonwood	15.30
74.	Lincoln	16.00

TABLE E

Total Cost of County and Judicial Ditches in Minnesota Counties

The counties are listed in accordance with the amount spent by each. The figures are taken from 1913 report of the State Drainage Commission

1.	Marshall	$1,496,302
2.	Polk	816,035
3.	Beltrami	685,235
4.	Aitkin	470,620
5.	Redwood	417,000
6.	Jackson	398,195
7.	Kandiyohi	366,531
8.	Freeborn	335,221
9.	Pennington	330,022
10.	Clay	328,224
11.	Martin	327,519
12.	Lac qui Parle	315,331
13.	Renville	311,109
14.	Kittson	296,290
15.	Red Lake	276,731
16.	Brown	274,956
17.	Wilkin	265,690
18.	Chippewa	252,777
19.	Roseau	221,344
20.	Le Sueur	210,450
21.	Otter Tail	182,000
22.	Norman	172,053
23.	Anoka	154,190
24.	Stearns	148,615
25.	Koochiching	139,757
26.	Pope	139,422
27.	Nicollet	136,167
28.	Todd	124,807
29.	Faribault	121,349
30.	Big Stone	120,772
31.	Lincoln	116,776
32.	Sibley	114,938
33.	Hennepin	109,600
34.	Watonwan	106,269
35.	Wadena	93,725
36.	Meeker	92,551
37.	Douglas	90,511
38.	Waseca	81,955
39.	Murray	80,386
40.	Grant	77,432
41.	Chisago	74,676
42.	Lyon	74,177
43.	Blue Earth	72,968
44.	Stevens	71,296
45.	Yellow Medicine	71,238
46.	McLeod	69,115
47.	Wright	68,913
48.	Swift	64,283
49.	Isanti	63,010
50.	Nobles	61,894
51.	Crow Wing	59,927
52.	Steele	58,525
53.	Traverse	57,180
54.	Dodge	55,235
55.	Sherburne	54,315
56.	Mille Lacs	32,780
57.	Cottonwood	32,098
58.	Benton	31,506

59. Carver	26,904	67. Clearwater	15,500
60. Washington	25,033	68. Wabasha	14,694
61. Ramsey	24,994	69. Carlton	13,488
62. Cass	24,737	70. Pine	12,858
63. Dakota	23,060	71. Scott	6,270
64. Kanabec	22,201	72. Itasca	5,822
65. Rice	17,966	73. Winona	4,480
66. Becker	16,267	74. Hubbard	4,375

TABLE F

Total Number of Acres Benefited in Minnesota by State Ditches

Counties are listed in order as to amounts drained in each. Figures are from 1913 report of State Rrainage Commission

County	Acreage	Cost
1. Roseau	487,036	$564,727
2. Marshall	153,268	140,326
3. Kittson	143,619	158,590
4. Aitkin	142,257	137,607
5. Polk	70,787	72,056
6. St. Louis	54,300	53,885
7. Koochiching	51,200	52,415
8. Norman	29,000	32,018
9. Itasca	21,000	24,343
10, Clay	20,000	24,854
11. Traverse	17,000	19,563
12. Wilkin	15,500	19,241
13. Beltrami	5,500	7,619
14. Otter Tail	3,800	4,757
15. Hubbard	3,670	9,733
16. Red Lake	2,500	3,188
17. Wadena	1,600	1,846
18. Clearwater	1,000	2,199
19. Becker	600	878

TABLE G

Average Net Profit Per Acre on Lands Drained by County and Judicial Ditches in Minnesota

That is, differences between average per acre cost of drainage and average per acre benefits assessed. Based on figures in 1913 report of the State Drainage Commission.

1. Faribault	$14.26	16. Wright	8.49
2. Freeborn	13.20	17. Lincoln	8.23
3. Stevens	12.77	18. Lyon	7.75
4. Swift	11.98	19. McLeod	7.33
5. Dakota	11.61	20. Meeker	7.29
6. Winona	11.34	21. Stearns	6.94
7. Carver	10.84	22. Hubbard	6.82
8. Nobles	10.16	23. Nicollet	6.78
9. Hennepin	10.06	24. Lac qui Parle	6.70
10. Waseca	9.92	25. Scott	6.21
11. Sibley	9.65	26. Pine	5.60
12. Steele	9.13	27. Blue Earth	5.12
13. Benton	8.84	28. Jackson	4.01
14. Renville	8.83	29. Rice	3.62
15. Cottonwood	8.73	30. Watonwan	3.46

31. Todd	3.40	51. Brown	1.35
32. Pope	3.25	52. Roseau	1.35
33. Sherburne	3.17	53. Kittson	1.03
34. Becker	3.02	54. Pennington	1.03
35. Chippewa	2.80	55. Crow Wing	.93
36. Redwood	2.74	56. Marshall	.79
37. Big Stone	2.55	57. Polk	.65
38. Aitkin	2.50	58. Cass	.59
39. Otter Tail	2.36	59. Itasca	.54
40. Kandiyohi	2.27	60. Martin	.32
41. Grant	2.19	61. Yellow Medicine	.10
42. Murray	2.18	62. Ramsey	.07
43. Koochiching	2.11	63. Washington	.01
44. Chisago	2.06	64. Wadena	.00
45. Wilkin	1.81	65. Douglas	.01*
46. Kanabec	1.66	66. Wabasha	.01*
47. Traverse	1.62	67. Carlton	.10*
48. Anoka	1.61	68. Mille Lacs	.11*
49. Isanti	1.52	69. Dodge	.25*
50. Beltrami	1.41	70. LeSueur	2.45*

*Loss.

APPENDIX 5

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  b Bulletins of department of agriculture
  c Bureau of experiment stations publications
  d The Congressional Record
  e House and Senate reports and documents
  f Geological Survey reports
5 State government publications
  a Reports of state boards
  b Reports of Wisconsin legislative committee on forestry, water power and drainage
  c Reports of state treasurers and state auditors of Minnesota
  d Messages of governors of Minnesota
  e Opinions of attorneys general of Minnesota

II SECONDARY

1 Books
2 Magazines
3 Miscellaneous
  a Drainage convention proceedings and addresses
    (a) National
    (b) North Carolina
    (c) Southern Commercial Congress
  b Personal letters (approximately 150)
  c Newspapers
  d Newspaper article of George A. Ralph, former Minnesota state drainage engineer

B. BIBLIOGRAPHY

American School of Correspondence, *Sewers and Drains,* Chicago, 1909.
Ball, S. M., Reclaiming the Everglades, *Putnam's Magazine,* 7:796-802, 1909.
Broward, N. P., Draining the Everglades, *Independent,* 64:1448-9, 1908.
Broward, N. P., Homes for Millions: Draining the Everglades, *Collier's,* 44:19, 1910.
Bishop, T., Practical Work in Kentucky, *Drainage Journal,* 24:161-4, 1902
Body, John B., The Drainage of the Valley of Mexico, *Engineering Record,* 44:131-4, 1901.
Brown, R. T., History of Drainage in Indiana, *Drainage Journal,* 24:275-8, 1902.
Cache River Drainage Commission, *Report,* Danville, Illinois, 1905.
California Engineer Department, *Report,* 2 vols., Sacramento, 1880-1881.
Costin, J. T., "Our Drainage System," in Bar Association of Arkansas, *Proceedings,* 167-188, 1908.
Elliott, C. G., *Drainage of the Upper Yazoo Delta,* Washington, 1912.
Elliott, C. G., *Engineering for Land Drainage,* New York, 1912.
Elliott, C. G., *Practical Farm Drainage,* New York, 1908.

Graham, A. W., Drainage in Western New York, *Science*, New Series, 28:527-34, 1908.
Gray, E. D. McQ., *Government Reclamation Work in Foreign Countries*, Washington, 1909.
Hill, J. J., Our Wealth in Swamp and Desert, *World's Work*, 19:12595-12617, 1910.
Iowa State Drainage Waterways and Conservation Commission, *Reports*, Cedar Rapids, 1911.
Iowa State Drainage Convention, *Proceedings*, Ames, 1904-1905.
King, F. H., *Irrigation and Drainage*, New York, 1899.
Kipp, H. A., *Report on the Belzoni Drainage District in Washington County, Mississippi*, Washington, 1912.
Kirtley, J. S., Land Reclamation in the South, *World Today*, 21:872-7, 1911.
Larned, E. S., "The Drainage of Swamps for Watershed Improvement," New England Water Works Association *Journal*, 16:36-50, 1902.
Leighton, M. O., Nearly 80,000,000 Acres Awaiting Farmers, *World's Work*, 23:80-85, 1911.
Lupfer, S. L., The Florida Everglades, *Engineering News*, 54:278-80, 1905.
McCallie, S. W., *A Preliminary Report on Drainage Reclamation in Georgia*, Atlanta, Georgia, 1911.
Matthews, J. L., *The Conservation of Water*, Boston, 1910.
Missouri Bureau of Labor Statistics, *Supplemental Report*, Jefferson City, 1910.
Mitchell, G. E., The National Drainage Problem, *World Today*, 13:777-84, 1907.
Morehouse, A. D., Reclamation of the Southern Louisiana Wet Praire Lands, *Scientific American Supplement*, 71:268-70 and 276-8, 1911.
Morgan, A. E., "The Drainage of the Mississippi Delta," *Manufacturers' Record*, 58:47-8, 1910.
Morgan, A. E., "The Drainage of Northeastern Arkansas," *Manufacturers' Record*, 58:63-4, 1910.
North Carolina Drainage Convention, *Proceedings*, Raleigh, 1909 and 1911.
National Swamp Reclamation, *Scientific American*, 97:390, 1907.
Reclamation of the Friedburg Peat Bogs, *Scientific American*, 102:165, 1910.
Southern Commercial Congress. Swamp and Overflowed Lands in Florida, United States 62 Congress 2 session, *Senate Document 734*, Washington, 1912.
Tatum, S., Reclamation and Drainage in the South, *Annals American Academy of Political and Social Science*, 35:77-80, 1910.
Tennessee Geological Survey, *Drainage Reclamation in Tennessee*, Nashville, 1910.
Trustees of Internal Improvement Fund of Florida, *Minutes*, Tallahassee, 1904-1910.
United States Department of Agriculture, Expenditures for Drainage Investigations, United States 62 congress, 2 session, *House Document* 466, Washington, 1912.
United States Department of Agriculture, Library List of References to Publications Relating to Irrigation and Land Drainage, *Library Bulletin* 41, Washington, 1902.
United States Department of Agriculture, Office of Experiment Stations, Preliminary Report on the Drainage of the Fifth Louisiana District, *Circular 104*, Washington, 1911.
United States Department of Agriculture, Office of Experiment Stations, Report on the St. Francis Valley Drainage Project in Northeastern Arkansas, *Bulletin 230*, Washington, 1911.
United States Department of Agriculture, Tide Marshes of the United States, *Special Report* 7, Washington, 1885.
United States Department of Agriculture, Office of Experiment Stations, Tidal Marshes and Their Reclamation, *Bulletin 240*, Washington, 1911.
United States Department of Agriculture, Office of Experiment Stations, Land Drainage by Means of Pumps, *Bulletin 243*, Washington, 1911.
United States Department of the Interior, Examinations for the Drainage of Lands, United States 62 Congress, 2 session, *Senate Document 151*, Washington, 1912.

United States Congress, The Everglades of Florida, 62 Congress, 1 session, *Senate Document 89*, Washington, 1911.
United States Geological Survey, Reclamation of Certain Lands in Minnesota, United States, 59 Congress, 2 session, *House Document 607*, Washington, 1907.
Watts, E. E., Drainage Improvement by Dredging, *Engineering News*, 47:139-40, 1902.
Will, T. E., The Everglades of Florida, *American Review of Reviews*, 66:451-6, 1912.
Willey, D. A., Draining the Everglades, *Scientific American*, 104:67-9, 1911.
Willey, D. A., Draining the Everglades, *Cassier's Magazine*, 39:418-32, 1911.
Wisconsin Legislative Committee on Water Powers Forestry and Drainage, *Reports*, Madison, 1910, 1911.

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